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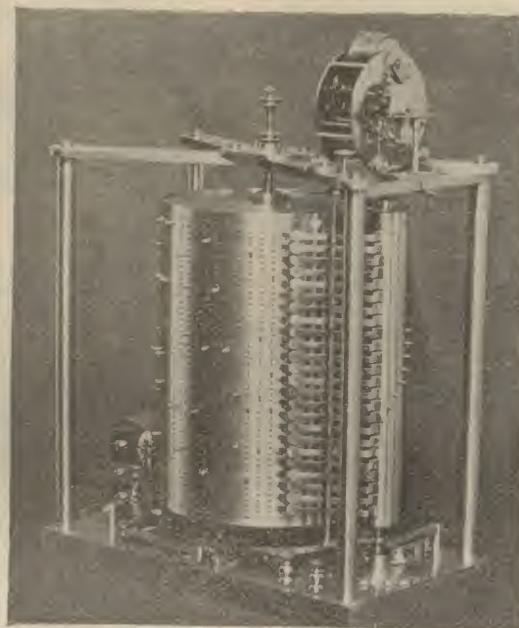
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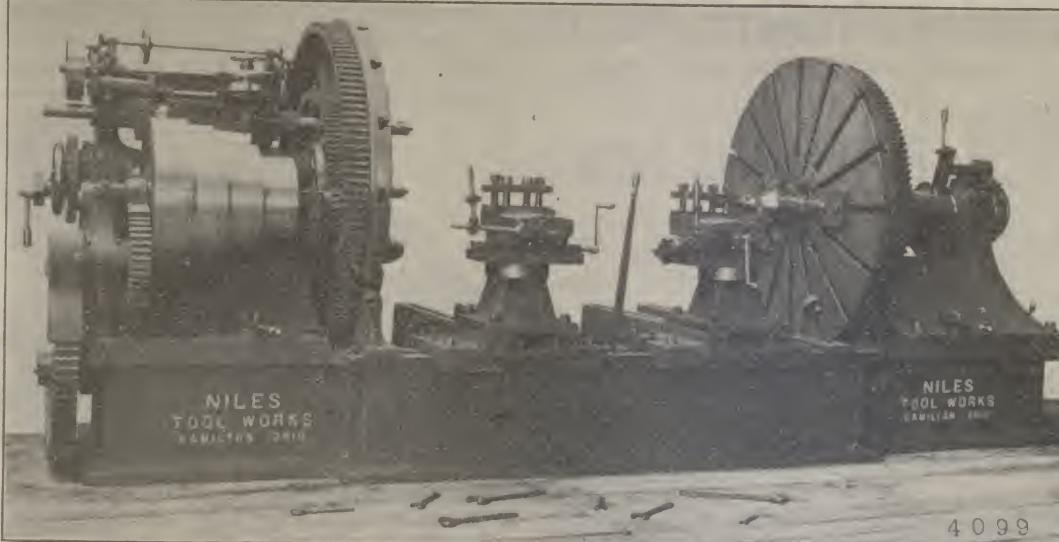
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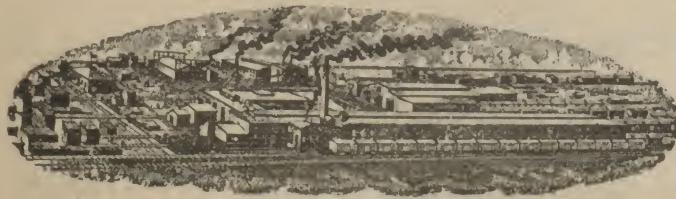
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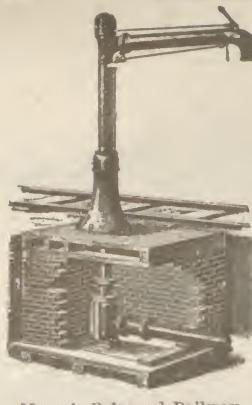
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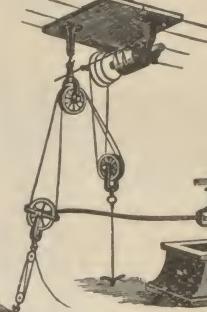
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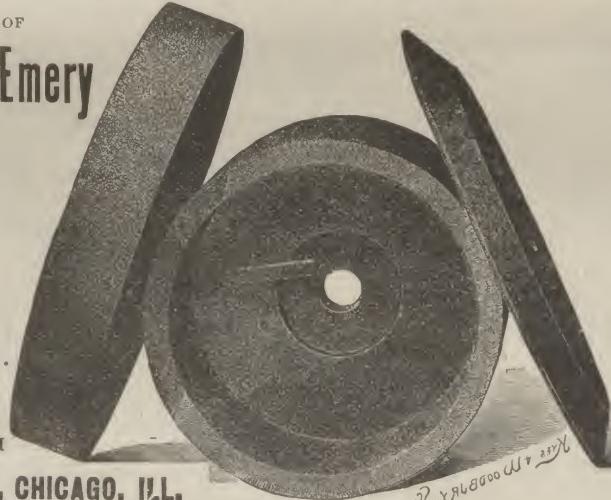
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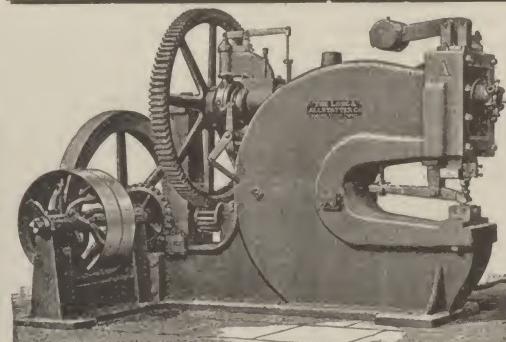
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R THE RAILWAY REVIEW

XXXVI.

JANUARY 18, 1896.

No. 3.

RESULT OF BOILER PLATE TESTS.—Some interesting results have been obtained by the Paxton Rolling Mills, of Harrisburg, Pa., on tests of boiler plates for twenty Russian locomotives now building at the Baldwin Locomotive Works. The steel had to show a tensile strength of 35 to 42 kilos. per square millimetre (about 50,000 to 60,000 lbs. per square inch), and an elongation in 8 in. of 25 per cent. both longitudinal and transverse. With the exception of twenty plates $\frac{3}{8}$ by 87 in. wide, the material varied from $\frac{1}{2}$ to $\frac{3}{4}$ in. thick by 74 in. wide and under. Of the 104 plates rolled, three failed in tensile and 1 on gage. In elongation the remaining 100 plates averaged 27.46 per cent. in the longitudinal direction and 27.90 per cent. in the transverse—the latter result not generally looked for. All the steel slabs were furnished by the Pennsylvania Steel Company, made in their open-hearth basic furnaces, and showed an average analysis as follows: Carbon, 0.165; phosphorus, 0.014; manganese, 0.37, and sulphur, 0.27.

CUTTING OF CYLINDERS.—Low pressure pistons for railway engines of large power not infrequently weigh as much as 5,000 lbs. When this weight is concentrated on the lower part of the cylinder bearing surface and oscillated back and forth at the rate of 800 ft. a minute, the cases where it does not cut the ordinary cylinder casting are more surprising and harder to account for than the cases where it does. Such cutting takes place when the piston is not provided with a tail rod, and is therefore most frequent in large cross compound units of the horizontal type. In large units this cutting has become so serious a matter that the advantage presented by a tandem engine in the support to the low pressure piston incident to its construction is considerable. It is true that there are cases where cross compound engines with heavy pistons are working very successfully, but it is also true that the manufacturers have found great difficulty in duplicating these successful units. This points to fortunate circumstances in the casting of the cylinder rather than to excellence of design. Unless, therefore, marine practice is adopted and the cylinders of horizontal engines are supplied with bushings that will better resist wear, the conclusion would seem to follow that, other things being equal, the tandem design is better suited than the cross-compound for horizontal engines of large size.—Electric Railway Gazette.

LOSS IN UNCOVERED STEAM PIPES.—Experiments have, according to the Improvement Bulletin, recently been made by Mr. A. W. Haacke respecting the amount of heat lost by radiation through steam pipes. The tests were directed to determine the relative losses of heat from, first, bare pipes; second, pipes covered with 1 in. of insulating composition; and third, pipes covered with 1 in. of insulating composition and three layers of hair felt. The testing surfaces consisted of three cast iron steam pipes of 5 in. external diameter, and 6 ft. long, with blank flanges on each end. The pipes were supplied by steam that had been dried and so placed as to be subject to radiation and conduction under precisely similar conditions, one being bare and two others covered, as before mentioned. The results of the experiment are quite interesting. With steam at a pressure of from 45 lb. to 60 lb., out of a possible loss of 100 per cent, as much as 83 per cent is saved by a 1 in. covering of composition. If over this covering 1 in. and $1\frac{1}{2}$ in. of hair felt with canvass is added, the extra saving is only 8 $\frac{1}{4}$ per cent. If 1 lb. of coal is required to evaporate 8 lb. of water into steam at 60 lb. pressure, then every square foot of uncovered steam pipe wastes 6 $\frac{1}{2}$ cwt. of coal per year. At a higher pressure of steam, and in cold weather, this loss is even greater.

REFINEMENTS OF MEASUREMENTS.—Refinements of measurements have gone to almost incredible limits. On lenses curvature of 1-150,000 inch can be measured. In spectroscopic analysis of mere traces of different elements, fractional wave lengths are read to 1-2,500 millionth of an inch. Professor Dewar in his researches on liquid air attained a vacuum of 1-2,500 millionth of an atmosphere by filling a vessel with mercurial vapor and exposing it to a very low temperature, and Professor Boys, with the simplest possible arrangement of quartz fibre, torsional balance, and mirror, claims to have been able to just detect an attractive force of the 1-20,000 millionth of a grain. So much for minute weights and measures, and as regards angles the Darwin pendulum will indicate a movement of 1-300th of a second, which would be about the angular measurement of a penny piece at the distance of 1,000 miles. It is difficult to realize the minuteness of measurements like the preceding. The smallest gold coin of the realm, if drawn out into a wire 1-2,500 millionth of an inch diameter, would be long enough to stretch to the sun and back again ten thousand times, and yet the fundamental mystery of the constitution of atoms and molecules would be locked up in every infinitesimal portion of the length of that minute wire. "For the establishment of a truer and more comprehensive theory of elasticity," write the authors of the last important work on the subject, "we shall probably have to wait until we gain a wider acquaintance with the nature of intermolecular action."—Engineering Mechanics.

RUSSIAN RAILROADS.—No other people on earth are showing such enterprise and boldness in building new railroads as the Russians, says the Railroad Gazette. Where they get the money to build the great lines across rude and thinly-peopled countries, and even across countries which are uninhabited, is a mystery, but they are building them. One of the works now underway is a railroad 400 miles long from Vologda to Archangel. Vologda is a little to the north of the middle of European Russia. It is about 10 deg. of longitude east of St. Petersburg and about 1

deg. of latitude south. Archangel is a port at the head of a gulf of that name on the White Sea. This railroad was authorized by a decree issued July 10, 1894. The rails are now laid on 12 miles of it. The work now under way is from Archangel south, and 7,000 men are employed there. For 20 miles the line is through an uninhabited wilderness, and for 160 miles south from Archangel there is but one village of 15 cottages on the line. Much of the way there are forests through which cuttings must be made before horsemen can pass. At one place in the province of Archangel the railroad will be carried for 16 miles on a pile trestle. At Archangel elevators and docks will be built and establishments for freezing fish, and it is expected that the entrance to the port will be deepened to 22 ft. before the railroad is built through. In 1895 24,000 tons of freight were shipped by sea from Archangel, and 1,005 vessels of greater or less size entered there. It is proposed to establish along the line of this railroad stations which shall be not only railroad stations, but trading posts.

EFFECT OF HIGH PRESSURES ON WOOD.—Soft wood becomes stronger than hard wood under pressure. The case of a block of Oregon pine, taken from the middle of an upright which formed a part of the timber support in the Comstock mines for twelve years, gives an example of the effect of heavy pressure on wood fibre. It is so hard that it cannot be cut with a knife, and one of its sides is polished from the squeezing it has undergone. Yellow pine from the lower levels of the Comstock has been so compressed by the enormous weight that its density exceeds that of lignum vitae.

AIR BRAKE RECORDS.—The New York Central has been endeavoring to ascertain to what extent the use of air brakes on its freight trains has been directly and indirectly profitable. For the last two years all through freight trains have been controlled by the air brake entirely. It is stated that a reduction in the number of brakemen has been made, resulting in a direct saving in operating expenses of somewhat more than \$95,000 per annum. The only additional expense offsetting this saving is the cost of repairs and maintenance of the air brake equipment, which has been for the freight cars only, about \$26,000 per annum. The net saving in operating expenses has, therefore, been about \$163,000 per annum, which is stated to be equal to over 6 per cent. interest on the cost of equipping with air brakes all the freight cars in service. As the company pays only 4 per cent. upon its bonds, and about 5 per cent. on its stock, it is apparent that there is a decided direct profit over and above interest charges, due to the use of air brakes. In addition to this direct profit, and far exceeding it in importance, is the reduction in the accident account, which has been 50 per cent. in number, and 65 per cent. in cost, largely, no doubt, on account of the air brakes, though partly because of the fine block signal system recently introduced.

A GOOD STEAMBOAT RECORD.—The Goodrich line passenger steamer Virginia has a record of 120 round trips between Chicago and Milwaukee during the season of 1895. Although docked once during the season, the Virginia suffered no delay. On arriving in Chicago after the day run to Milwaukee and return, she was run to the dock of the Chicago Ship Building Co. and was out again the next morning ready for the trip to Milwaukee. This is certainly very successful work with a big passenger steamer. A. W. Goodrich, president and general manager of the Goodrich company, probably holds a more responsible trust in the management of the affairs of this line than any young man on the lakes. A ship builder who has had some dealings with him of late says he knows more of the details of ship construction than any one he has ever met in this country who did not claim to be a naval architect.

POWDERED COAL FOR STEAM PURPOSES.—A prominent mechanical engineering firm in London, England, is reported to be making exhaustive tests of the use of powdered coal for steam boilers of all types. The results of the experiments, shortly to be made public, will be important, showing the heat balances, analyses of gases and the evaporation and general efficiency of coal dust as compared with ordinary fuel. The system used is a new process, the invention of a German named Wegener. By it the coal is ground to a dust by pulverizers. To insure complete combustion a current of air is produced by a fan, and the powdered coal is mixed with it before going into the boiler. This method has been tested by the North German Lloyd Steamship Co. and others, and the results obtained are said to have been sufficiently satisfactory to encourage its further development. It is stated that the chimney draft is sufficient to provide a current for drawing the dust automatically into the fire-box. Thus no stoking is needed and no fire-bars are required, combustion being almost complete. The saving of fuel by this system is claimed to be as much as 20 per cent.

NEW NORTHERN PACIFIC COAL BUNKERS.—The construction of the new Northern Pacific coal bunkers at Tacoma has commenced. Most of the timbers are already piled up on the spot, there being between seventy-five and a hundred cars of them, which came mostly from Centralia. The grading for the foundations of the coal bunker has progressed slowly on account of the rain, the water interfering with the work to such an extent that during the rains the men have been employed carting earth from the bank above the site of the coal bunkers to the waterfront, where it is used to fill in beneath the railroad track built upon low piling at that place. The bunkers when completed will have a capacity of 12,000 tons of coal and will be supplied with all the latest inventions and appliances to give vessels quick dispatch in loading. There will be an electric conveyor equipment which will handle 400 tons of coal per hour, loading it on vessels.

THE BALTIC AND "SOO" CANAL COMPARED.—When Germany opened the North Sea Baltic canal some time ago the nations of the earth joined in a big naval display, and festivities attending the celebration extended over several days. The canal was pronounced a great commercial enterprise. In this connection the Marine Review compares the business since developed in this canal with the

commerce of St. Mary's Falls canal, which connects Lake Superior with other bodies of water in the chain of great lakes, and about which our own government makes no fuss whatever. During November, 1895, 1,394 vessels, whose total net carrying capacity was 157,172 register tons, passed through the North Sea Baltic canal. This is equal to about 7 per cent. of the business of St. Mary's Falls canal for a single month. The average number of vessels per month passing through the St. Mary's Falls canal during seven and a half months of navigation in 1895 was about 2,400, and the average freight tonnage of the canal per month was about 2,000,000 net tons. These figures may be verified in detail by reference to the Marine Review of December 19, which contains the full report of the war department covering St. Mary's Falls canal commerce during 1894 and 1895.

AXLE FAILURE IN GREAT BRITAIN.—Of the 138 axles which failed on the railways in the United Kingdom during the nine months ending September 30 last, 82 were engine axles—viz., 63 crank or driving and 19 leading or trailing—13 were tender axles, 3 were coach axles, and 40 were wagon axles, 1 of which was a salt van. Of the wagons, 16 belonged to owners other than the railway companies. Of the 63 crank or driving axles, 24 were made of iron and 39 of steel. The average mileage of 22 crank or driving axles made of iron was 236,870 miles, and of 37 crank or driving axles made of steel 248,164 miles.

EDUCATING APPRENTICES ON INDIAN RAILWAYS.—According to some English technical journals the system adopted on some Indian railways of educating apprentices might well be copied in England as far as circumstances permit. The East Indian Railway goes in for the business very thoroughly. At Jamalpur, where the locomotive department headquarters are situated, there is a building for the accommodation of apprentices whose relations do not live in the station, where each lad has a furnished room to himself. The house is in charge of a steward, who arranges for the messing, and keeps the lads and the place in order generally. Before being taken on every boy has to pass an examination to prove that he is educated up to a certain standard, after which, as an apprentice, he has to attend the night classes under competent masters, where his general education is carried still further; and he is also taught the theory of the work on which he is engaged, besides mechanical drawing and elementary chemistry, so that it is not the East India Railway Company's fault if, on the completion of his apprenticeship, the man is not a thorough mechanic. The Rajputana Malwa Railway do not house their apprentices, but educate them in night classes held by the railway schoolmaster, and in day classes held in the works they get a thorough grounding in the theory of steam, applied mechanics, and mechanical drawing by the chief draftsmen. The Bombay, Baroda & Central India Railway have drawing classes in the workshops, taught by the chief craftsman; the North-Western Railway have a night school in Lahore for apprentices. This compares our contemporary states, very favorably with the English railways; with but few exceptions an apprentice pays a fairly heavy premium, and is taught—just about as much as he can pick up.

EXPRESS TRAINS IN FRANCE.—In a paper on the speed of express trains in France from 1854 to 1895, recently read by Mons. R. Varennes before the French Society of Civil Engineers, Paris, the author stated that the French companies may be divided in point of speed into three categories. First, is the Nord, by itself, with a maximum speed of 52 $\frac{1}{2}$ miles an hour. Then comes the east of France; the Southern (connecting the ocean and the Mediterranean); the Paris-Lyons-Mediterranean; the Orleans, with 45 to 46 miles an hour; and lastly, the West of France, which extends over agricultural districts, and serves no large towns, shows 42 miles an hour, still a very creditable pace for the continent.

RAILWAYS IN JAPAN.—Railway enterprises were the first—so far as the business world is concerned—to feel the beneficial effect of the restoration of peace. Various private companies have applied for charters for the construction of lines in different parts of the country. Of these some are to be electric lines, for instance, those between Tokyo and Yokohama, and Osaka and Kobe. These places being already connected by government railways, considerable doubt is entertained as to whether the required charters will be granted. There is also a project for constructing a network of electric lines in Tokyo. It is stated that the companies competing for the construction of a line between Hakodate and Otaru in Hokkaido will be amalgamated. The length of the line is about 180 miles. Its construction would give a new impetus to the development of the northern island. Besides this projected private line, the authorities of the Hokkaido administration office contemplate introducing into the coming session of the Diet a bill for the construction of important lines in the center and north of the island. They have been prompted to think seriously of these enterprises by the unexpectedly favorable results of the extension of the Poronai-Otaru line as far as Muroran. Another railway project that attracts attention is that of the Chugoku Tetsudo Kaisha, whose capital is to be 5 million yen. The line is to connect Okayama with Sakai, a harbor of considerable importance on the sea of Japan. The distance between the two places is a little less than 100 miles. A provisional charter having already been obtained, a general meeting of the shareholders will shortly be convened at Osaka. The construction of this line will probably lead to the abandonment of the projected State road between Himeji and Sakai, for the Okayama-Sakai line would answer the purposes of the former much better.

"OIL ON THE WATERS."—An infinitesimal force manifests itself in the spreading of a drop of oil over the surface of water. The spreading is due merely to the excess of the tension of the surface separating the water from the air, as compared with the sum of the tensions of the surfaces separating the water from the oil and the oil from the air. A film 1-30 millionth of an inch in thickness produces marked results, and yet to cover the whole 135 acres of painted surface of the Forth Bridge with a coat of that

thickness would require less than a pint of oil. It would appear inconceivable that such a membrane could in any way affect the ocean in a storm, yet, when in the winter of 1891, Admiral Cuverville's ship, the *Naiade*, was caught in a cyclone in the North Atlantic, and a greasy touch was given to the waters by rigging out two coal sacks, each filled with about 11 lbs. of tow and one gallon of colza oil, which latter required renewal only every six hours, the scientific and trained observers on board the French warship reported the result to be a remarkable practical success, the oil taking effect upon the dangerous breakers due to horizontal translation produced by the wind, but, of course, leaving the swell unaffected.

Summer Excursion Rate Meeting,

In accordance with the resolution adopted at the Syracuse meeting, January 30, 1895, the annual summer rate meeting is called at the Hotel Brunswick, Fifth avenue and Twenty-seventh street, New York city, at 10 o'clock a. m., Wednesday, January 29, 1896, to make summer tourist and excursion rates from Niagara Falls, Detroit, Port Huron, Montreal and Quebec to all summer resorts in the Eastern States and Canada.

Owing to the rapid development of summer tourist business to resorts in Canada and the Eastern States, it is requested that all lines, whether directly or indirectly interested, be represented at this meeting. To arrange the details as far as possible the rate clerks will meet at the same place and at the same hour on Tuesday, January 28, 1896.

American Society of Railroad Superintendents.

The next meeting of the society will be held on the second Wednesday of September, 1896 (September 9), at Niagara Falls. It is recommended that at least a two days session be held, and that members bring their ladies with them.

A sub-committee of two, consisting of Messrs. Knibloe and Brunn, has been appointed to take entire charge of hotel, excursion and other arrangements for the entertainment of members and their guests on the occasion of the next meeting, said committee having full power to act for the society in the matters referred to it.

The secretary has been instructed to extend to the Buffalo Association of Railroad Superintendents the cordial invitation of the American Society of Railroad Superintendents to be present at its next meeting and take part in the proceedings and festivities of the occasion. One of the topics for discussion at the next meeting of the society will be the report of the Special Committee on the Relations of Railroad Companies with their Employes, which was made by Mr. C. R. Fitch, chairman, at the last meeting, as will appear in the printed proceedings of the said meeting.

The secretary has been further instructed to communicate, in sufficient season before the next meeting, with the managing officers of the railroad companies, soliciting their support and co-operation in the matter of increasing the membership and attendance, and of securing a larger representation of their superintendents at the meetings. The secretary has been further instructed to forward to each of the standing committee of the society the earnest request of the executive committee that the chairman of each committee place its report in the hands of the secretary not later than August 1, 1896, in order that the same may be printed and distributed to the membership in proper season before the next meeting. It is also desired that members who are to prepare papers to be presented at said meeting, be governed by the same rule.

REVISION OF THE M. C. B. INTERCHANGE RULES.

The "Committee of Twenty-one," appointed in accordance with the resolution adopted at the Alexandria Bay Convention of the Master Car-Builders' Association to prepare a revision of the rules of interchange met in Pittsburgh, November 14, 1895, and prepared a code of rules which is to be submitted to the six railway clubs for discussion. After this discussion, the committee will revise the rules and prepare them for presentation to the arbitration committee of the M. C. B. Association for consideration at the next convention. In the following abstract of the code references are given to illustrations and tables which appear in the 1895 revision of M. C. B. rules:

GENERAL.

RULE 1. Each railway company shall give to foreign cars, while on its line, the same care as to oiling, packing and running repairs that it gives to its own cars.

RULE 2. Cars offered in interchange should be in safe and serviceable condition, the receiving road to be the judge.

INSTRUCTIONS FOR INSPECTORS.

RULE 3.

SECTION 1. A car with defects which do not render it unsafe to run or unsafe to trainmen, or to any lading suitable to the car, must be accepted; but in case the defects are such that owners are not responsible for them, the receiving road may require that a defect card be securely attached to the car with four tacks, preferably on the outside face of intermediate sill, between cross-tie timbers. Defect cards shall be $3\frac{1}{2}$ in. by 8 in., and of the form shown below. They shall be printed on both sides, and shall be filled in on both sides with ink or black indelible pencil. The card must plainly specify in full each item for which charges are authorized. (Card shown on page 19 revised rules).

Sec. 2. Cars must be accepted unless some of the defects enumerated below exist or exceed the limits given.

DEFECTS OF WHEELS.

Sec. 3. Shelled out; wheels with defective treads on account of pieces shelling out, leaving flat spots deepest at the edge, with a raised center. Wheels must not be condemned from this cause, unless the spots are over $2\frac{1}{2}$ in., or are so numerous as to endanger the safety of the wheel. Repairs chargeable to owners.

Sec. 4. Seams 1 inch long or over, at a distance of $\frac{1}{2}$ in. or less from the throat of the flange, or seams 3 or more inches long on any other point of the tread. Repairs chargeable to owners.

Sec. 5. Worn through chill; when the flat spot caused by wear exceeds $2\frac{1}{2}$ in. in length. Care must be taken to distinguish this defect from flat spots caused by sliding wheels. Repairs chargeable to owners.

Sec. 6. Worn flange; flanges 1 inch thick or less, or having flat, vertical surfaces extending more than 1 inch from tread. (See Figs. 3 and 4 revised rules.) Repairs chargeable to owners.

Sec. 7. Thick flange; flanges over 1 7-16 in. thick. This does not apply to wheels cast prior to September 1, 1894. Repairs chargeable to owners.

Sec. 8. Tread worn hollow; if the tread is worn sufficiently hollow to render the flange or rim liable to breakage. Repairs chargeable to owners.

Sec. 9. Flat sliding; if the flat spot caused by sliding is $2\frac{1}{2}$ in. or over in length. (Care should be taken to distinguish this defect from *worn through chill*.) Delivering roads must make repairs, or card, at the option of the receiving road.

Sec. 10. Burst; if the wheel is cracked from the wheel fit, outward, by pressure from the axle. Repairs chargeable to owners.

Sec. 11. Broken or chipped flange; if the piece broken off exceeds $1\frac{1}{2}$ in. in length, and $\frac{1}{2}$ in. in width, or if it extends $\frac{3}{8}$ in. past center of flange. Repairs chargeable to owners if caused by seams, worn through chill or worn flange. If broken flange is due to other cause, then the delivering road must repair or card, at the option of the receiving road.

Sec. 12. Broken or chipped rim; if the tread, measured from the flange at a point $\frac{1}{8}$ in. above the tread, is less than $3\frac{1}{4}$ in. in width. (See Fig. 5.) Repairs chargeable to owners if caused by defective casting. If the broken rim is due to other cause, the delivering road must repair or card, at the option of receiving road.

Sec. 13. Cracked tread, cracked plate, one or more cracked brackets, or broken in pieces under fair usage. Repairs chargeable to owners. Breakage of any kind caused by derailment or accident, must be repaired or carded for by the delivering road, at the option of the receiving road.

DEFECTS OF AXLES.

Sec. 14. Axles bent or broken with collars broken or worn off, under fair usage, or if less than the following prescribed limit. (See page 7).

Sec. 15. Cut journals or damage of any kind caused by derailment or accident must be repaired or carded for by the delivering road at the option or the receiving road.

DEFECTS OF MOUNTING WHEELS ON AXLES.

Sec. 16. Loose wheel; repairs chargeable to owners.

Sec. 17. Out of gage, as indicated in Figs. 6 and 6a (pages 8 and 9); repairs chargeable to owners.

DEFECTS OF BRAKES.

Sec. 18. Brake wheel not secured to the shaft with properly fitted nut.

Sec. 19. Bottom of brake shaft not secured by a nut or key or some other suitable device to prevent shaft lifting out of position.

Sec. 20. Brake chain not secured to shaft with bolt, and bolt properly secured by nut or by rivet.

Sec. 21. Upper brake shaft bearing not properly secured to the end and top of box and stock cars by either two bolts or one bolt and one lag screw not less than one-half inch in diameter.

Sec. 22. Brake ratchet wheel not sound and well secured to shaft.

Sec. 23. Brake pawl, when attached to brake step or to upper brake shaft bearing, not secured with bolt and nut. When applied to roof of car not secured with either bolt or lag screw. Pawl not sound and point effective.

Sec. 24. Brake steps not secured by bolts in each of the two brackets. Brackets not secured to car by either four bolts or four lag screws. Brake step not sound at outer edges through both bolt holes.

Sec. 25. Brake shaft step not secured to car by either two or four bolts or lag screws. When the draw-bar carry irons form the step, if two bolts passing through draft timbers are not effective.

Sec. 26. Brake hangers not secured to car body or truck with full complement of bolts and nuts the hanger is drilled to receive, and also if not secured to brake head and beams in like manner. Brake beams, levers and attachments less than $2\frac{1}{2}$ in. from the top of the rail.

Sec. 27. Brake heads not in a condition to hold the shoes in place when applied.

Sec. 28. Brake shoes not secured to brake head in proper manner as required by the form of head.

Sec. 29. Brake shoes less than $\frac{3}{8}$ in. thick at center.

Sec. 30. Brake wheels with any defect.

Sec. 31. Brake beams unsound and when hung to body not provided with guide irons.

Sec. 32. Brake beam fulcrums (cast iron) unsound or with bolts missing. Wrought iron fulcrums not firmly secured.

Sec. 33. Brake connections not properly secured.

Sec. 34. Cylinder or triple valve of air brake cars not cleaned and oiled within twelve months and the date of the last cleaning and oiling marked on the brake cylinder.

Sec. 35. Brake shoe slack on air brake cars not so adjusted that under the full application of the brakes, the piston travels not less than 5 in. nor more than 9 in.

Sec. 36. Brakes on air brake cars not applying and releasing promptly with proper handling by the engineer's valve.

Sec. 37. Triple valves and auxiliary reservoirs not free from water.

Sec. 38. Air pipes and all connections thereto not free from leaks or the pipes improperly secured to the car body so that injury that might occur to the apparatus or leaks be produced by shaking and vibration of the pipe.

Sec. 39. Air brake cars not provided with two $1\frac{1}{4}$ in. hose and couplings in good order which are properly secured in the dummy couplings when not coupled to other cars.

NOTE.—If the car has air signal pipes or air brake pipes, but no air brakes, the hose and couplings on the car are at owner's risk, unless the car is stenciled that it is so equipped.

All repairs to brakes to make them comply with above conditions are chargeable to the owners (except 17, 18, 19 and 21) unless caused by derailment or wreck. Similar defects caused by derailment or wreck must be repaired or carded for by delivering road at the option of receiving road.

DEFECTS OF TRUCKS.

Sec. 40. All defective or missing or worn-out parts of trucks not already mentioned, which have failed under fair usage, chargeable to owners. Similar defects due to derailment or wrecks must be repaired or carded for by delivering road at the option of the receiving road.

Sec. 41. Trucks having any parts less than $2\frac{1}{2}$ in. above top of rail, repairs chargeable to owners.

DEFECTS OF BODY.

Sec. 42. Damage for which owners are not responsible.

Sec. 43. Owners are responsible for failure under fair usage of any part of the body of the car.

Sec. 44. A delivering road must repair or card for damage caused by rough usage, derailment or wreck.

Sec. 45. Damage to sills and draft gear shall be considered as caused by rough usage if—

Damaged couplers or draw-bars or draw-bar springs are accompanied by simultaneous damage to either draw lugs and attachments, carry irons and filling blocks, draw timbers or their substitutes, or end sills;

Drawbar pockets, spindles or their substitutes, and followers are accompanied by simultaneous damage to either draw lugs and attachments, carry irons and filling blocks, or end sills;

Draw lugs and attachments, carry irons and filling blocks are accompanied by simultaneous damage to either couplers or draw-bars, draw-bar springs, or end sills;

Draw timbers or their substitutes are accompanied by simultaneous damage to couplers or draw-bars, draw-bar springs, draw-bar pockets, spindles or their substitutes and followers, or to end sills;

Deadwood or buffer is accompanied by simultaneous damage to end sills.

End sills are accompanied by simultaneous damage to couplers or draw-bars; draw-bar springs; draw-bar pockets, spindles or their substitutes, and followers; draw-bar lugs and attachments, carry irons and filling blocks; draw timbers or their substitutes; deadwood or buffer, or longitudinal sills.

Longitudinal sills are accompanied by simultaneous damage to end sills.

Sec. 46. In the case of simultaneous damage to longitudinal sills by foreign roads, owners shall not be responsible, if the damage is so extensive as to require the replacement of more than two sills.

Sec. 47. In the case of simultaneous damage to corner and end posts, by foreign roads, owners shall not be responsible if the damage is of such a character as to require the replacement or repairs to more than two end or two corner posts at one end, or more than one end and one corner post at same end of car.

Sec. 48. Center sills, or draft timbers spliced must be replaced or carded for by the delivering road at the option of the receiving road.

Sec. 49. Intermediate or side sills recently spliced in a manner not complying with Rule 4, Sec. 9, to be repaired or carded for by the delivering road at the option of the receiving road.

Sec. 50. If cars offered in interchange have missing material (bolts and nuts excepted) the receiving road may require a defect card covering such missing material, which card shall be a voucher against the railroad furnishing it for the cost of repairs.

Sec. 51. End or side doors missing where cars are not so stenciled must be repaired or carded for by the delivering road, at the option of the receiving road.

Sec. 52. Locks, grain doors and inside parts of cars are at owner's risk except where damaged by wreck or unfair usage.

DEFECTS OF COUPLERS AND DRAW-BARS.

(The paragraphs lettered from A to J on pages 12 to 17 of the 1895 rules have been numbered from 53 to 61 in the new code and paragraph G has been omitted.

Sec. 62. M. C. B. couplers not equipped with a steel or wrought iron knuckle.

Sec. 63. Wrought iron draw-bars broken off outside of tenons, or broken or cracked in the opening of face plate, or in the angles of the pocket, or through rivet holes, or with the filling lost. Cast iron draw-bars broken or cracked through pin hole or back of head, or with bolts or rivets missing where wrought pockets are used.

Sec. 64. Cars originally equipped with link and pin couplers refitted with draw-bars not fitting properly nor having sufficient strength.

INSTRUCTIONS TO REPAIR MEN.

RULE 4.

SECTION 1. Any company finding a car with defect card attached may make the repairs noted upon the card, provided such repairs are necessary for the safe running of the car, and render bill for same to the company attaching card, stating upon the bill the date and place when the repairs were made; the card to accompany the bill as voucher for the work done, but no bill shall be rendered for repairs which have not been made.

Sec. 2. Any company finding a car with defect card attached may make such partial repairs as may be necessary for the safe running of the car. It shall strike the items repaired from the card by drawing two lines in ink through such items on both sides of the card and replace the card upon the car. It shall notify the company which issued the original card of the items repaired, and the latter company shall issue a defect card covering the partial repairs made, that card to be used as a voucher, and to accompany the bill for such partial repairs.

Sec. 3. Repairs to foreign cars shall be promptly made, and the work shall conform in detail to the original construction, and with the same quality of material originally used, except as hereinafter provided; new standard parts may, however, be used if agreed to.

Sec. 4. In repairing damaged cars M. C. B. standards may be used when of design and dimensions that do not mar or impair the strength of the cars, in lieu of the parts forming its original construction.

Sec. 5. Any company finding a link and pin draw-bar in a car originally equipped with a draw-bar of the M. C. B. type, and so marked, and carded for wrong material

a car containing 60,000 lbs. of freight in 1894 was 22 per cent less than that obtained from hauling a car containing 20,000 lbs. of freight in 1870. The train expense is greater, the general expense is greater, and the entire cost of operating a railroad is greater than in 1870. A railroad of any importance that shows operating expenses less than 65 per cent of earnings is accused of failing to maintain the property. The ratio of operating expenses to earnings of six railroads running into Chicago shows the following percentages: 65.86 per cent, 68.37 per cent, 72.80 cent, 62.35 per cent, 57 per cent, 74.59 per cent.

The question is often asked if the modern locomotive moves as much tonnage in proportion as the smaller engine did 25 years ago. Old engineers frequently remark that the engines of to-day do not do the work in proportion to their size that the smaller ones did 25 years ago. Facts show that we are getting better work with the modern engine. Every condition is more favorable to the modern engine; we have greater weight on driving wheels, larger heating surface and increased steam pressure. Some records show a consolidation engine built in 1870 to have had 20x24 in. cylinders, a total weight of engine of 100,000 lbs., with 85,000 lbs. on driving wheels, 1,500 ft. heating surface in the boiler, and 140 lbs. steam. A consolidation engine built in 1895 shows a great difference in everything except the cylinders, which are the same. The total weight of engine now is 150,000 lbs., weight on drivers 137,000 lbs., heating surface in boiler 2,200 ft., steam pressure 180 lbs. The engine of 1870 hauled 24 loads weighing 528 tons, while the 1895 engine hauled a train of 35 loads weighing 1,120 tons over the same division. The increase in passenger service is almost as marked. Twenty-five years ago with a time schedule of 22 miles an hour it would have been considered an impossibility to make an engine haul 10 cars on a schedule of 40 miles an hour, yet it is now done every day, and these engines maintain a speed of 55 miles per hour between stations with 10 cars. Have we reached the limit with the modern engine, and have we determined how much a locomotive can be made to earn for the company?

The question should only be considered from one standpoint, that is, how much can we make the engine earn? To accomplish this, that is, make it earn all it can, the idea must be given up that an engine should run from 75,000 to 100,000 miles before it is taken in the shop. When freight engines are kept in service until they have made that mileage the company is not getting the revenue the engines could earn. An engine in freight service should haul every ton of freight it is capable of doing regardless of cost for repairs and fuel. When the performance is considered on a mileage basis, or with reference to how cheap it can be run and how many miles it will make between general repairs, there will be frequent complaints made by the mechanical department of over-loading, and an effort will be made to have the train reduced in order to favor the engine so that there can be a better average made on repairs and coal. After four years experience with tonnage rating on grades ranging from 40 to 96 feet to the mile, it has resulted in a general increase in average number of cars per train. Where 22 loads was a train over some of the heavy grades, by the tonnage system frequently 26 cars are hauled with the same engine that hauled 22 cars for a full train. In another case where 28 cars was a full train, a tonnage rating has increased the train to 35 loads with the same engine. It was supposed that 28 loads was a full train, and trainmen were of the opinion that the engine could not pull 35 loads, but after several tests it was demonstrated that the engine was capable of doing this, and no further trouble was experienced in hauling a train of 1,100 tons.

When we consider the service of a locomotive from the standpoint of what it can earn, and not what it costs per mile to run it, we will then begin to increase the number of freight cars per train and arrive at the question affecting the revenue of the company, and that is the cost of hauling a loaded car per mile or cost of hauling a ton of freight one mile. There are very few roads in the west on which the train haul could not be increased on some of the districts. An increase of one car, containing 20 tons of freight, in each train will increase the earnings of a locomotive in one year \$7,200, and the only additional expense would be 90 tons of coal. Taking the average mileage of a locomotive at 3,000 miles per month, or 36,000 miles per year, we have the revenue of 20 tons of freight hauled the same mileage at one cent per ton per mile or 20 cents per mile per car. There has been no increase in the wages of the engineer, fireman or trainmen, or for repairs. The only extra expense has been five pounds of coal per car mile. Taking the average tonnage per car for the year on six western roads, which is 11.44 tons per car, the locomotive can earn on this basis \$4,118.40, per year for the company more than it did before. By keeping the engine in first class condition at all times, I believe every locomotive in freight service on our western roads can be made to earn at least \$4,000 more for the company, per year, than at present; and the expense will not be increased except for fuel at the average rate of five pounds of coal per car mile.

The monthly statements of locomotive performances sent out by railroads, when compared, show a wide difference in cost, and unless the conditions of making them up are known the comparisons are unsatisfactory. Some roads allow engines only actual mileage between terminals, regardless of length of time making the trip. Should the train be delayed several hours by switching or meeting trains, no mileage is allowed. If held at terminal waiting trains, no mileage is allowed. In helping service the engine is only credited with actual mileage. While the crew will receive a day's pay the engine may make but 30 miles in 12 hours.

It is the practice of a number of roads to allow constructive mileage to all engines in passenger and freight service. Some roads add 10 per cent to the mileage, as it is claimed to make up for the coal and oil used in taking the engines from the roundhouse to the train and in leaving the train and being put in the roundhouse. In addition to this they are allowed ten miles per hour for switching or layouts on the road. Where overtime is paid the engineer, the engine is given mileage to make up for it. By

this system of watering mileage a locomotive report is made to show a good average on coal and oil and low cost for repairs and a large individual engine mileage, when the actual cost is 10 to 15 pr. ct. greater than that shown by the report.

Taking the annual reports of some western roads, considering the freight engine mileage, with freight car mileage, they show the following percentages of freight engine mileage to freight car mileage:

4.06 per cent.
4.76 per cent.

4.76 per cent.
4.37 per cent.
4.24 per cent.
5.35 per cent.
5.32 per cent.

The combined mileage of passenger and freight trains compared with the engine mileage in same service shows following percentages of engine to car mileage:

8.78 per cent.
7.57 per cent.
7.44 per cent.
7.76 per cent.
11.29 per cent.
6.48 per cent.

The following gives number of cars per train when figured on the same basis for all the roads:

18.80
18.66
23.60
22.86
20.99
16.70

There is no uniformity in rating trains. One road rates

and others thus

two empties as one load, others three empties two loads, and others five empties three loads. A train of ten loads and 20 empties under these systems would be called respectively, 20 loads, 22 loads and 24 loads. But the showing on paper would convey the impression that one road was hauling a greater number of cars per train than another, when there is a probability that the road showing the smaller train haul was moving the same tonnage.

Following this matter still further, the average tonnage for a loaded car for the year on five roads shows:

12.87 tons.
9.09 tons.
9.84 tons.
11.40 tons.
12.26 tons.

With such a variation in the manner of allowing mileage and rating trains, no satisfactory comparison can be made, and until all roads show the cost of moving a loaded passenger and freight car one mile, the locomotive performance sheets will be of little value for comparison.

The problem of to-day with decreased rates is to haul greater tonnage in each car and reduce the cost of doing it. The revenue of a railroad is derived from the services rendered by its locomotives. To increase the revenue the locomotives must do more work. The tendency is to

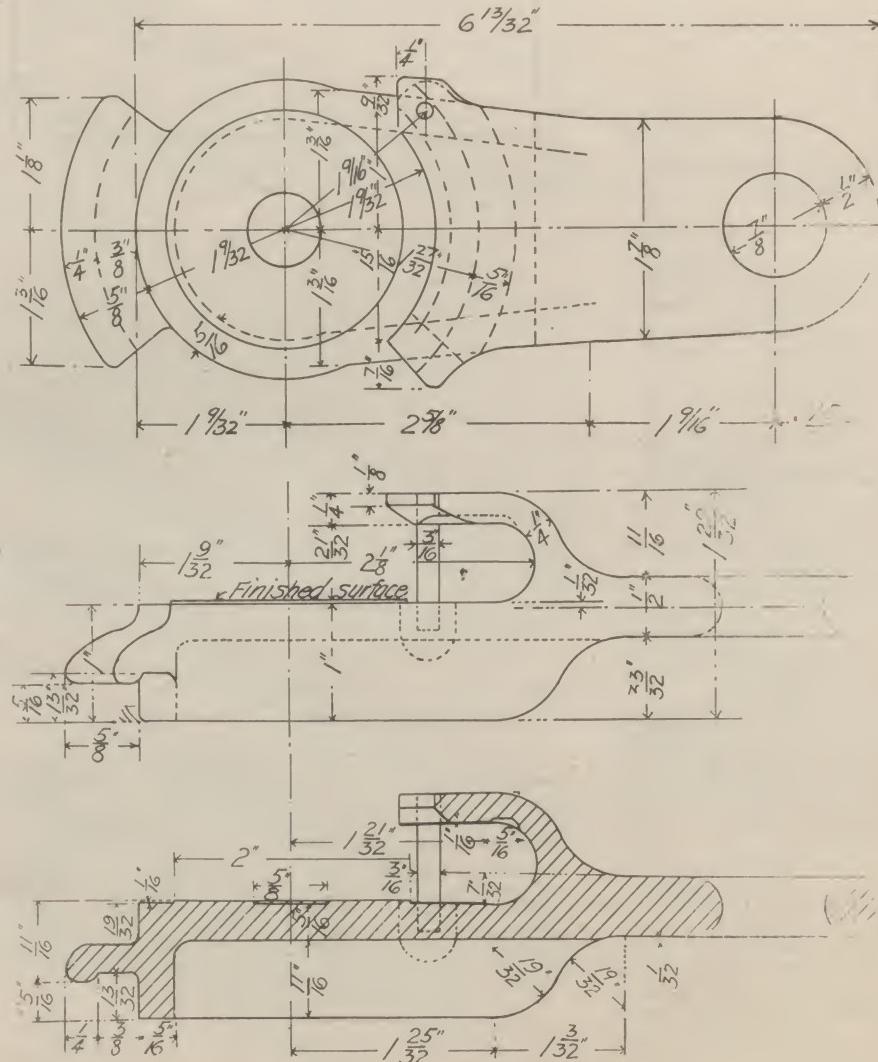
ical and transportation departments work together. An increase in the steam pressure of five pounds will, in many cases, take one more car over the grade.

When the mechanical departments of our railroads give the same attention to increasing the train haul that they do to making a showing of how cheap they can run the locomotives per mile, they will find they have obtained increased service from the locomotive, decreased the cost of hauling a ton of freight, and increased the revenue of the company. The problem of to-day is, how much does it cost to haul a ton of freight one mile, not what does it cost per mile to run your locomotives.

AN AIR-TIGHT DUMMY COUPLING.

In the discussion on air brake hose at the December meeting of the Western Railway Club Mr. A. M. Waitt, in speaking of dummy couplings exhibited one which has been in use upon the Michigan Central for some two years, and said in substance that he was informed that they are entirely satisfactory, and that it could not be patented and is open for anybody to use. There is only one feature a little against it—it cannot be used as a rigid coupling on account of the necessity of coupling with it as with the air hose. It will hang up and adjust itself. It couples the same as air brake coupling and is air tight. It is not necessary to use the angle cock. With the Westinghouse dummy, when the coupling is put down into its place there is an opening, and it cannot be coupled so that it will be tight. That dummy coupling is ineffectual in keeping out dirt, and another curious thing is that with the latest Westinghouse dummy couplings the trainmen frequently hang up the hose with the hose coupling face up, leaving the opening absolutely without protection.

Through the courtesy of Mr. E. D. Bronner, master car builder, and Mr. J. A. Chubb, superintendent of air brakes of the Michigan Central Railroad, we are enabled to illustrate this dummy coupling, which is the invention of Mr. Chubb. It is made of malleable iron galvanized. It is made on the general lines of the hose coupling, but is blind, having no opening through it for the air. Neither has it a gasket, but its face is a smooth finished surface that prevents injury or uneven wear to the gasket which may be coupled to it, and at the same time insures an air tight joint. It is attached to locomotives and cars in about the same place and manner as is the dummy in common use, and it will be seen that the eye at the top end of the casting permits it to swing to insure the proper



AN AIR TIGHT DUMMY COUPLING

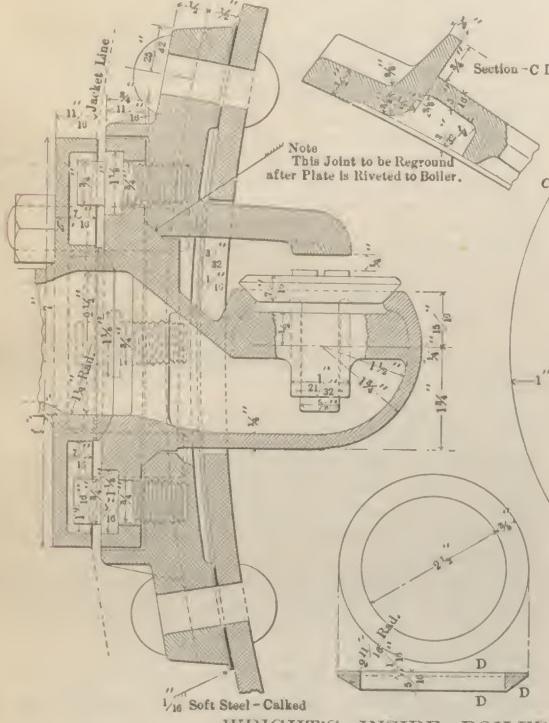
increase their weight and size, and there is not enough attention paid to getting increased service of those now owned. The freight earnings largely exceed the passenger earnings, and by directing efforts to hauling increased tonnage the revenue is increased without any great increase in the operating expenses. The weight of a train over a division is usually determined by the amount of tonnage an engine can haul over certain grades. In nearly every case increased tonnage can be hauled if the mechan-

which he believes more imaginary than real, but that to their use on locomotives he believes that there can be no objection, there being no good reason why angle cocks should not be removed from every engine. It is stated that the manager of the road has authorized the removal of angle cocks from all the engines, dummy couplings having been put on instead, and these are reported to be giving perfect satisfaction.

WRIGHT'S INSIDE BOILER CHECK.

The serious nature of the danger of the scalding of passengers and employees on account of locomotive boiler checks being broken off in collisions renders this subject one in which all motive power men are interested. In the RAILWAY REVIEW of November 23, 1895, a form of inside boiler check was illustrated and described. Since the appearance of that description we have received the drawings and description of another similar device which, it is stated, was designed and patented before that previously shown. The accompanying illustrations were sent by Mr. Wm. Wright, chief draftsman of the office of the general superintendent of motive power of the Pennsylvania Railroad at Altoona, Pa., the designer and patentee. This is now the standard check of the Pennsylvania Railroad, and it has thus far been applied to about one hundred locomotives and is reported to have given entire satisfaction.

By reference to the print the similarity in design of the two checks with a few minor changes in details will be noted. The check is composed of a flange, securely riveted to the boiler and calked, with a recess in the front face to receive a flanged valve cas-



WRIGHT'S INSIDE BOILER

ing which projects into the boiler, and carries the valve. From the inner face of the plate, extending into the boiler, and over the top of the check valve, is a projection or finger, which acts as a stop against too great an upward motion of the valve. The valve operates in a vertical direction allowing the water to enter all around the valve opening, washing the seats thoroughly in its passage. The valve casing is securely fastened to the riveted flange by four tap bolts, over which is placed the elbow to which the feed pipe is attached which is also secured to the riveted flange by four studs. That portion of the check that could cause trouble in case of a rear end collision is therefore very securely fastened to the boiler, is all under the jacket, and as close to the boiler as possible, the only projecting portion being the pipe elbow, which is made very light at its junction with the flange, so as to give way at that point in case of its being struck in an accident.

The flange on the elbow projects partly into the jacket to make a good finish, and on being removed the valve casing can be drawn out through the hole in the jacket, made for the flange of this elbow, without disturbing or removing it as was formerly required. As stated, the valve acts in a vertical direction which is a very important point, from the fact that the valve is not seated by pressure after the injector is shut off, as is generally supposed, but by gravity alone as will be readily seen when the fact is considered that the pressure is the same on both sides of the valve at the moment of closing, owing to the pressure of a check valve in the injector. Neglect of this fact, Mr. Wright says, was the cause of the old type of hinge valve failing in so many instances, when but a small quantity of sediment had deposited on the hinge. The flange and elbow as shown are malleable iron castings, the valve and casing being of brass, and as will be seen all superfluous metal has been discarded that could be spared and provide the necessary strength. The design seems to be a most excellent one and it is difficult to see how the boiler steam could do any damage from the breakage of the elbow or the connection leading to the check. The steam could escape only in case of the flange being torn off bodily which is very unlikely as it is held by ten $\frac{3}{4}$ in rivets..

THE WESTERN RAILWAY CLUB.

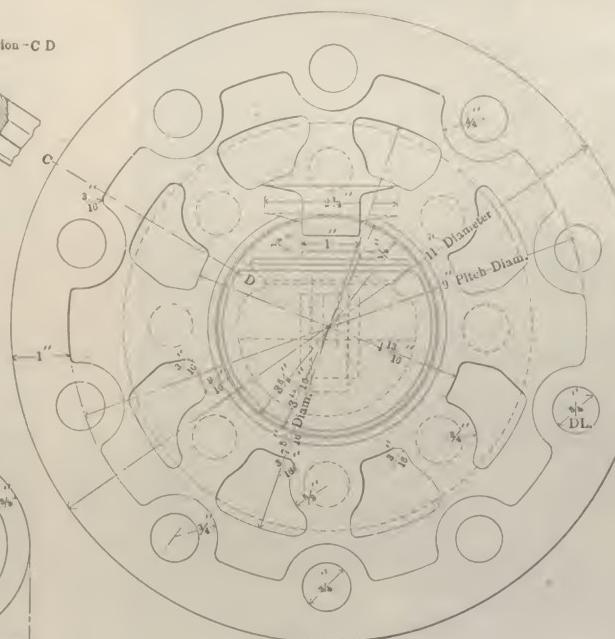
The Western Railway Club will hold its next meeting on Tuesday, January 21, at 2 p.m., in the Auditorium Hotel, Chicago. There will be a continued discussion on air brake equipment on freight cars, based upon Mr. A.

M. Waitt's paper presented at the November meeting and upon the discussion thereon at the December meeting. There will also be a discussion on locomotive service based upon the paper presented at the December meeting by Mr. J. H. McConnell. There will also be a discussion on the interchange rules, based upon the report of the M. C. B. Committee on Revision of Interchange Rules. The paper of the day will be entitled "The Ninety and Nine," and will be presented by Mr. J. N. Barr, S. M. P., of C. M. & St. P. Ry.

The Cost of Railway Trains.

Few persons have a correct idea of the enormous investment represented by a train of cars. One passenger coach costs as much as a comfortable home, while the price of a sleeping car exceeds that of a palatial residence. Even the ordinary freight car is worth considerable money, and the usual string of them represents the value of a large farm. Locomotives cost well up in thousands of dollars, and individuals who have never given the subject any thought will be surprised at the figures.

Expense in car construction varies just the same as expense incurred in constructing anything else where various degrees of quality in material and



CHECK FOR LOCOMOTIVES.

labor must be taken into consideration. The highest grade of train service in the world is maintained on the Pennsylvania Lines. Coaches used on this vast system do not cost less than \$5,000 each. Every part, metal and wood, is carefully selected and put together by experts in the car building art. It is due to the exercise of this care that coaches used on the Pennsylvania system are not surpassed for solidity and smooth running. These characteristics are essential when continuous long trips are to be made. Every day in the year coaches run over the Pennsylvania Lines between Chicago and New York and between St. Louis and New York without change. The distance between Chicago and New York by his route is 912 miles, the shortest railway line between those cities. From St. Louis to New York the distance is a little over 1,000 miles by the shortest line, which is that formed by the Pennsylvania. A coach standing in Chicago Union Station to-day may be in New York to-morrow. The same may be true of a coach now standing in St. Louis Union Station. Continuous trips are also made by coaches over the Pennsylvania Lines between Chicago and Cincinnati, and between Chicago and Louisville through Indianapolis. En route they are carefully looked over by car inspectors, and periodically they are sent to the shops for a complete overhauling. In this way their usefulness is prolonged, and newly invented improvements are placed on them, so that they are up-to-date and in good condition at all times. The hundreds of coaches making daily short runs over the Pennsylvania Lines between points in Illinois, Indiana, Ohio, Pennsylvania and West Virginia are as carefully constructed and receive the same attention. Their construction, cost and style are as uniform as possible, considering the continual evolution toward the perfection point that ingenuity and skill are causing.

It is necessary to use five figures in computing the cost of a sleeping car. Ten thousand dollars is certainly a large sum to invest in one car, but that amount represents the price of a sleeping car of the Pullman pattern, the most luxuriously finished and furnished car of that kind. The upholstery and interior finish alone cost several thousand dollars. Parlor cars of this pattern cost a little less than a sleeper, and the Pullman dining cars are each worth a fabulous price. Every through train between Chicago and New York and between St. Louis and New York, as well as those running between Chicago and Cincinnati and Louisville over the Pennsylvania Lines carries Pullman cars.

The equipment of a through train, in addition to

the locomotive, usually consists of a baggage car, an express car and a fast mail car, followed by a compartment parlor smoking car, several coaches and the necessary complement of dining, parlor and sleeping cars. Only the best locomotives, and strong and marvelous pieces of mechanism they are, run over these lines and cost fully \$10,000. The baggage, express and mail cars are each worth several thousand dollars; the coaches one-half as much as the locomotive, and the Pullmans the same as the locomotive, making the value of a regular train exceed \$50,000. That investment is for the convenience of one or one hundred persons, for if only a single passenger boards the train it is run just the same. Contemplating this enormous investment with the uncertainty of the return it will yield, the thought comes up as to whether it is warranted. But a \$50,000 investment is small when compared to the outlay required to place in service one train running between Chicago and New York over the Pennsylvania lines. When it leaves Chicago Union station daily at 5:30 p.m., over one hundred thousand dollars worth of railway property moves away from the Windy City. This train, the world-famous Pennsylvania Limited, is composed exclusively of Pullman cars of the highest degree of magnificence, and is the most luxurious and most costly railway train in service in the world.

The cost of a freight train depends upon the number of cars in it, and whether they are gondolas or flat cars, or consist of stock cars or box cars for grain or merchandise. As many as 50 cars of the several kinds have been run in a single train, and the value of such a long string, allowing an average cost of \$300 for the cars, may readily be figured out. Freight locomotives cost nearly if not altogether as much as passenger locomotives. In addition to the engine and bare cars, the value of merchandise or other consignments loaded on them, aggregates surprisingly large sums, varying according to the nature of the shipments.

Difficulties with Air Braked Freight Trains.

The following remarks by Mr. J. C. Stewart, superintendent of the Galena division of the Chicago & Northwestern Railway at the December meeting of the Western Railway Club will interest motive power officers as expressing the opinion of a member of the operating department. This was offered in discussion of the paper by Mr. A. M. Waitt which appeared in abstract in the RAILWAY REVIEW of December 14, 1895.

"We average 100 freight trains a day, of which possibly 5 per cent are fully equipped with air, the remainder being partially equipped. Some of the difficulties that we have in the safe operation of those trains can be remedied by the motive power department and the car department. There is no question but what it requires greater skill on the part of the locomotive engineer to handle an air braked train only partially equipped with air, than it does to handle a fully equipped train. With a train of 30 cars, the 10 forward cars equipped with 'quick action' brake if it were possible by some 'quick action' movement to transfer the engineer into the caboose at the same time that he applies the air brake, it would have a great tendency to improve the handling of freight trains only partially equipped with air. Mr. Barr says there is no question about a great amount of damage being done in approaching a water tank. We admit it; but we should not lose sight of the real cause. Is it the fault of the air brake or the man that operates the air brake? We know that some men can approach a water tank with ten cars of air ahead and do no damage. Why is it not possible to attain such a degree of efficiency that all men will do the same thing? If we should put an air brake inspection car on the rear end of a freight train it would do more good than having the men study on a secluded track in the yard. I know personally of engineers who have spent days in the yards, and know all about the air brake; with a passenger train they will run very well, but give them a freight train of 30 cars with 10 air ahead, and they make some very bad stops. This is a difficulty which will be remedied when we get all the cars equipped with air brakes; so it is a feature which we must make the best of and do the best we can with the material we have."

In regard to breaking in two, we have had no accidents occasioned by burst air hose. They have burst, but have not done any damage. The principal cause of our trains breaking in two is resultant from making couplings between the vertical self-coupler and the link and pin. It invariably flattens the link and cracks it, and subsequent strain in the train frequently results in the parting of the train with the usual damage. These are the two difficulties—imperfect handling of the air brake under the most difficult circumstances, as I said before, and the great number of bent links occasioned by self-couplers being used in trains with the link draw-bar.

THE GOULD-TROJAN INJUNCTION CASE.

To the Editor:

Regarding the injunction issued by Judge Coxe in suit of the Gould Coupler Company against the Trojan Car Coupler Company for infringement of the Browning patent in its knuckle opening device, we beg to say through your columns:

That under the terms of the injunction the Trojan Company is authorized to go on for six months with such business and contracts as it has on hand.

The injunction was immediately appealed from and will come before the court of appeals at the March term.

The Trojan Car Coupler Company is prepared to protect its customers to the fullest extent in case of adverse decision.

The injunction does not in any way affect the Trojan coupler, except in regard to its knuckle opening device, and it will go on taking new business as before, with the exception that pending the dissolution of the injunction it will, on such new business, render the knuckle opening device inoperative; in which position it will be on the same plane with the Gould, Standard, Janney, Chicago and others which have no knuckle opening device.

THE TROJAN CAR COUPLER CO.,
Chicago, Jan. 16, 1896.

THE RIEHLE ABRASION TESTING MACHINE.

This apparatus consists of a revolving disc on a vertical spindle. It is geared three to one and the disc is fitted with a hardened steel grinding plate. Above this plate a horizontal arm is arranged so as to be capable of sliding backward and forward and carrying at one end a one inch cube or other shape of specimen to be subjected to abrasion. This arm also carries a weighted lever or graduated beam capable of loading the abrasion specimen as high as 200 lbs. The spindle of the machine is made to revolve by the bevel gears and 10 in. pulleys as shown, and an extra pair of gears of unequal size give motion by a cam and pin to the lever arm, which moves the horizontal arm backward and forward over the grinding disc. The apparatus is also furnished with a revolution counter for indicating the number of revolutions during the test, and with a sand box and water duct for furnishing grinding material. A brush or scraper may be used to clean the disc if desired.

It is intended to run the pulleys at about 150 to 175 revolutions per minute, giving 50 or more revolutions of the grinding disc. It is also intended that the lateral movement combined with the revolution will distribute the wear uniformly over a large part of the surface of the disc. The yoke or bracket crossing the top of the disc is to give support to the arm against the revolution of the disc. The flange of the main frame is arranged to protect the gearing parts and a spout carries off surplus sand and water. The machine was made for the Cambria Iron Company and is in use by them at Johnstown, Pa. It is 25 in. high, 29 in. wide, 34 in. long and weighs about 350 lbs. It is arranged to take specimens of 1 in. cube or smaller, and can be arranged to take 2 in. cubes also. The Riehle Bros. Testing Machine Company should be addressed at Philadelphia, Pa., for further information.

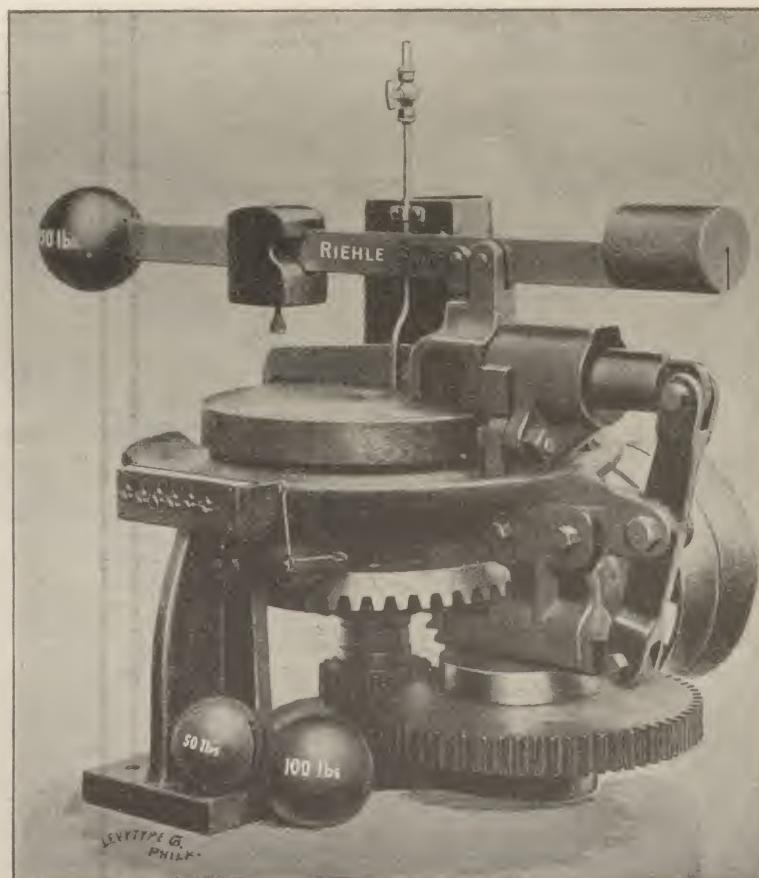
The Hardening of Extra Soft Steel.

The subject of the hardening of extra soft steel, which was dealt with at a recent meeting of the Academie des Sciences, in Paris, by Mr. Osmond, is noted in the *Calling Guardian*. Taking for example a test bar of steel carbonized by cementation in which the proportion of carbon varies in a continuous fashion (from 1.70 to 0.35 per cent) from one extremity to the other, if the bar be well hardened, and an attempt be made to scratch it by means of a sewing needle, the latter will scratch the softer parts—say up to the part containing about 0.70 per cent carbon. The mark or scratch then disappears, but, contrary to all expectation and to all ideas on the subject, it reappears in the part of the bar containing a proportion of carbon of about 1.30 per cent.

In examining the scratch or mark by means of a microscope in the most carbonized part, it is found not to be continuous, but that it appears to be a series of broken or interrupted lines. The part in question is therefore not homogeneous and contains at least two constituents, which may be here named A and B respectively. A, not scratched by the needle, scratches glass and feldspar. B is scratched by apatite, and probably of fluorspar. By giving them a good polishing, a slight difference in color will be found between the two constituents: B is of a silver white color, while A has a slightly grayish tint. Polishing in bas-relief on damp parchment, impregnated with a little brown-red, does not sensibly affect B, thus assigning to this constituent a resistance to inordinate wearing, having regard to its relative mineralogical hardness. By attacking it with tincture of iodine or by dilute nitric acid the mass is divided into only slightly coherent polyhedrons, sepa-

rated or not by traces of definite carbon, to which is attributed the formula Fe_3C . At the same time A and B assume different colors, but are ordinarily homogeneous for the same constituent within the limits of the same polyhedron.

The structure thus becomes very clearly defined. In most cases, A becomes distributed in barbed flakes parallel to two directions, which remain constant for each polyhedron; B forms the base. If the attack be prolonged, all the section becomes black, both constituents being carbonized. The hard constituent, A, is the same which forms almost exclusively hardened steel containing one per cent carbon. The proportion of the constituent B increases with the content of carbon up to about 1.60 per cent. To continue the experiments, by taking a steel not more complex but of a composition which has been found most convenient (for example, a steel containing 1.57 per cent carbon), and submitting it to a varying hardening process, it will be seen that to obtain the maximum of B, the steel must be heated up to at least



ABRASION TESTING MACHINE.

1,000 deg. C., (but not exceeding 1,100 deg. C.) and cooling it as rapidly as possible in iced water or in very cold mercury, otherwise the carbon, Fe_3C , becomes isolated again and diminishes to that extent the actual content of carbon in the remainder of the mass. Under the most favorable conditions, it is possible to obtain a mixture of equal parts (in round figures) of A and B. Such a mixture is, relatively, only slightly magnetic. A bar of it, with one far end placed against one pole of a powerful horizontal magnet, is supported vertically with difficulty, while a similar, hardened up to 800 deg. C., and cooling at 15 deg. C., is held horizontally.

The same mixture, with the parts A and B practically equal, cannot be filed, and breaks before it bends, owing both to the presence of the hard and fragile constituent A, and to the absence of cohesion between the polyhedrons. So far as it has been able to ascertain them from a mixture, the properties of B tend to make it similar to steel, having 25 per cent of nickel and from 12 to 13 percent manganese.

Annual Meeting of the Central Railway Club.

The annual meeting of the Central Railway Club, with its attendant banquet, which was held Friday, January 10, may be said to be one of those few occasions to which aphorism, "A feast of reason and a flow of soul," can be legitimately applied. An able and comprehensive report on the safe-ending of boiler tubes was read by the chairman, Mr. J. H. Moore. From the tests reported to the committee it was apparent that the lap-welded safe-end when properly made, is preferable to the butt-weld, as the latter will give way at the weld while the former will not. While no figures as to comparative cost was submitted by the committee, it was thought that the quickness with which the safe-end lapped-welds can be worked in a furnace specially designed for this purpose, that butt welding by hand cannot be done as cheaply as lap-welding.

Mr. A. M. Waitt, for the committee on the effect of salt water drippings from refrigerator cars upon track and road bed, presented a report compiled largely from the experience of railroad companies and owners with such cars. It was clearly shown that the exercise of special care was needed particularly on exposed parts of bridges to keep metal well covered with the best salt resisting paint. The committee believed it practicable to connect the drips on refrigerator cars with a reservoir under the car to hold the salt water until trains reached regular stopping points where the reservoir can be emptied, an overflowing being provided which would deposit the water midway between the tracks in event of the reservoir becoming filled.

The election of officers resulted as follows: President, E. D. Bronner; vice president, John Mackenzie; secretary and treasurer, H. D. Vought; executive committee, A. M. Waitt, E. A. Miller, C. E. Rood, and W. H. Gardner. The report of the secretary and treasurer showed a net increase of 48 members, and a considerable balance in the treasury. The banquet which was held in the large dining room of the Troquois hotel was one of the most enjoyable of the many previous occasions of that kind. The addresses of the occasion were interspersed with music and the whole meeting was a pronounced success.

A ROD MILL FOR SCRAP MATERIAL.

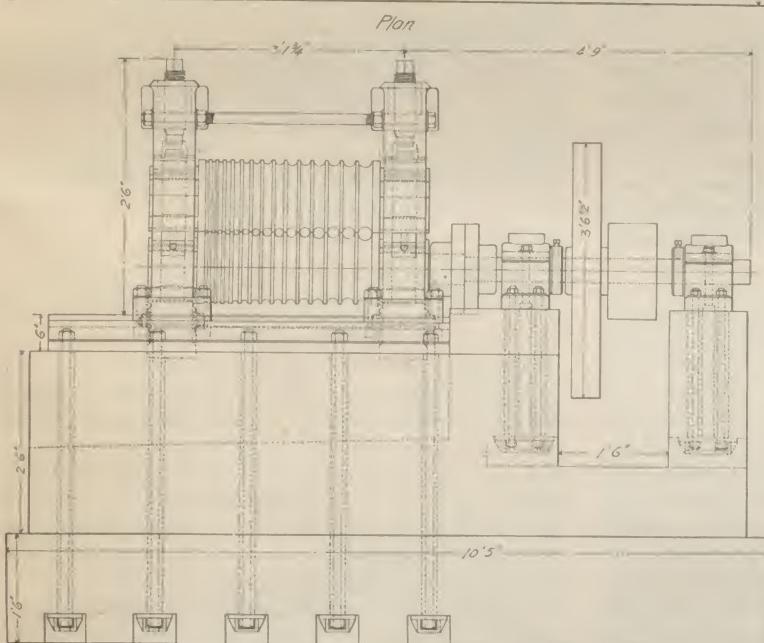
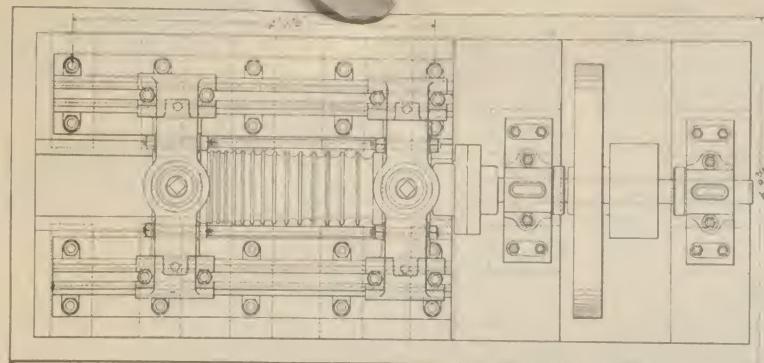
The accompanying illustrations, the drawings for which we are indebted to Mr. J. N. Barr, superintendent of motive power of the Chicago, Milwaukee & St. Paul Railway, show a new rod mill which has just been put into service at the West Milwaukee shops of that road. This machine is similar in principle to that in use upon the Southern Pacific road which is used for the same purpose, working over scrap material.

The rod mill plant is located near one end of the locomotive department blacksmith's shop, and it consists of the mill with a pair of 12 in. rolls, the furnace 14 ft. long outside and 2 ft. 10 in. wide inside, and an electric motor, all of which are shown distinctly in Fig. 1, which gives an idea of the arrangement of the plant. The motor has a pulley 14 in. diameter with a 10 in. face and runs at the rate of 575 revolution per minute. It is the type "A" of the Gibbs Electric Co. and develops 29 horse power with 104 amperes at 240 volts. The motor is controlled by a rheostat and switch board shown at the right of Fig. 1, which is attached to the wall of the building. The current for the motor is supplied by a generator in the locomotive department engine room, which is also used for other purposes. The motor drives an overhead countershaft by means of a 36 in. pulley running at 224 revolutions per minute. This counter-shaft is supported upon a frame of timbers attached to the lower chords of the roof trusses as shown in the detail in Fig. 3. The timbers are bolted to castings which are supported by means of tongues passed between the webs of the angles of the chords and held by keys passing through the tongues over the tops of the angles. The mill end of the counter shaft has an 18 in. pulley with 16 in. face, and the pulley on the roll shaft is 30 in. in diameter and runs at 135 revolutions per minute.

Fig. 2 gives three views of the mill and its foundations, upon which the principal dimensions are shown, and the principal details are presented in Fig. 3, which were taken from the working drawings. It will be noticed that the form of the fly wheel was



A ROD MILL FOR SCRAP MATERIAL—FIG. 1—GENERAL VIEW.



ings, the foundation and bed pieces are long enough to admit of using rolls 14 in. longer. The form of the housings and the method of attachment, as well as the fastenings, are clearly shown in Fig. 2. The whole design is substantial, and the work seems to have been most thoroughly done. The machine was built at the West Milwaukee shops and the designs were made in the drafting room. The arrangement of the furnace, rolls, and motor is good, and the idea of using an electric motor for this purpose indicates

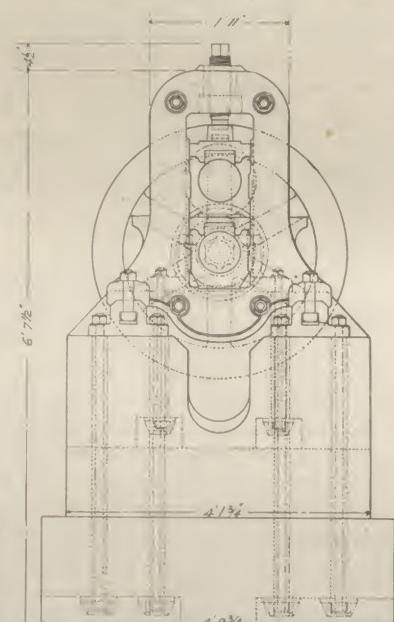


FIG. 2.—ARRANGEMENT OF ROLLS AND FOUNDATIONS.

slightly changed after these drawings were made and also that the location of the pulley for driving the rolls is also somewhat altered from that shown in Fig. 2, but the principles of construction are not materially affected thereby. The shaft is of wrought iron and 4 in. in diameter. The rolls are cast iron and the sizes of the grooves are as indicated upon Fig. 3. A substantial cast iron coupling shown in Fig. 3 connects the driving shaft with the bottom roll. The housings are mounted upon slotted cast iron bed pieces as shown in Fig. 2, and while the rolls in present use are 2 ft. 6 in. long inside of bear-

the high place which this form of transmission occupies in the opinion of the officers of this road. With its application in this instance the necessity of providing a special steam engine was avoided and consequently the location of the rolls and furnace could be made without reference to accessibility for steam piping and a further advantage of this method lies in the fact of the motor always being ready to start and requiring no attention beyond that of the men handling the rolls, who have merely to start and stop it and attend to its lubrication.

The mill is used for rolling down large sizes of

round iron, such as bridge rods, of which many are sent in from the old Howe truss bridges when renewed, and other pieces of large diameter into the sizes required for car and locomotive works. Also old car links are cut through at the ends and heated in the furnace after which they are rolled without straightening into $\frac{1}{2}$ or $\frac{3}{4}$ in. rods. It was thought that the short turn at the ends of the links might give trouble in the rolls, but no difficulty was found in making them enter. It is obvious that this apparatus may be employed for a variety of uses which may increase its value immensely to the road. It is now an experiment which has already satisfied Mr. Barr of its value, and it is thought that this will be largely increased by modifications which will enable short lengths of material to be handled without unnecessary loss of time. Upon the present basis, however, new material is produced from scrap at a cost averaging less than one-half cent per pound, and as the product thus obtained is also somewhat better than the grade of iron which would be bought for the same purpose, an advantage in quality as well as price is obtained. No attempt has yet been made to utilize the mill for rolling axles, or large material, but there seems to be no reason why the plant cannot be made very useful in this way. There would doubtless be some difficulty in straightening long pieces, but those turned out at present are sufficiently short to be conveniently straightened on the plate shown in Fig. 1, in front of the rolls. As this road gives schemes of this kind careful trials the result of further experiments upon it will be looked for with interest.

A Cheap and Durable Round-House Floor.*

*Report of a committee to the Southern and South Western Railway Club.

Your committee finds, after due consideration, that it would be a very difficult matter to say what would be the best floor; one that would combine durability and cheapness, from the fact that a round-house floor is subjected to various changes, and very hard usages, and should be able to withstand the heavy pressures from jacks, etc., the rolling of trucks and other heavy parts of machinery over it, the action of the hot water from the cylinder cocks and overflow pipes, and the oil drippings from the truck boxes. All these have more or less effect on floors. Your committee believes that a floor made of vitrified brick, in the following manner would be found very serviceable:

First, Make a bed of furnace slag or churt, about eighteen inches thick, then put a coat of sand over the slag and lay the brick on their edges, and after they are laid level them up by stamping. After this is done, a coat of hot coal tar is applied, which enters the spaces between the bricks and cements them together. The bricks should be laid in such a way that good drainage may be obtained, and the floor washed off occasionally with the hose.

Inasmuch as the floor close around the pits is subjected to harder usage and more severe strains than any other part, we would suggest that a piece of timber, about 12x14 inches, be laid full length of pit by the side of the one that supports the rail. This timber should be supported by brick pillars, built up from the side of the pit walls about six or seven feet apart. This would make a good jacking block, which could be replaced without much trouble or expense, and, in fact, we don't think it would need replacing often, as the oil drippings from the truck boxes would preserve the wood to a certain degree.

The Southern Railway Company has a floor made of vitrified brick in its round-house at Knoxville, and it is reported as giving good satisfaction. Such a floor will cost about \$1.00 per square yard.

A good many of our members are using yellow pine floors, the sleepers buried in cinders, and the floor nailed securely to them. Old car sills can be used for the sills, and make the floor very cheap. Such a floor can be laid for about 36 cents per square yard.

It is the opinion of your committee that cement floors for round-houses are a failure inasmuch as they soon crack and flake off after being used a short while, under the varying changes they are necessarily subjected to.

We are informed that the Ashland Coal & Iron Company has a floor in its machine shop, at Ashland, Ky., which has been in use for nine years, without any apparent wear or cracks from any injury received during the year of service. This floor was made by filling in with slag from iron furnaces for a depth of 18 inches to 2 feet, well broken up and packed or pounded down, then sand was put over this so that it would pack down between the lumps of broken slag. The whole was covered with a cement made from the same kind of slag, crushed and pulverized in an ore pan, and mixed with water until it reached the consistency of mortar. This was put on to a thickness of three or four inches, and rolled well with a heavy iron roller.

Mr. E. M. Roberts, formerly Master Mechanic of that road, informs us that this material makes a very hard and durable floor, as the material seems to run together and form one solid mass, which has the appearance of rock; but it is a question in our minds as to the durability of this kind of a floor for a round-house, inasmuch as it would be subjected to the changes of expansion and contraction heretofore spoken of.

Woolley & Gerrans, proprietors of the Grand Union Hotel, Saratoga, announce that they will open their hotel on June 15, 1896, in time for the June conventions, and they will make a special rate for members of the Master Car Builders' and Master Mechanics' Associations and their guests of \$4 per day of single rooms, and \$5 per day for room with bath. The Grand Union at previous conventions has received a large share of the patronage of parties in attendance and expects to do its share this year.

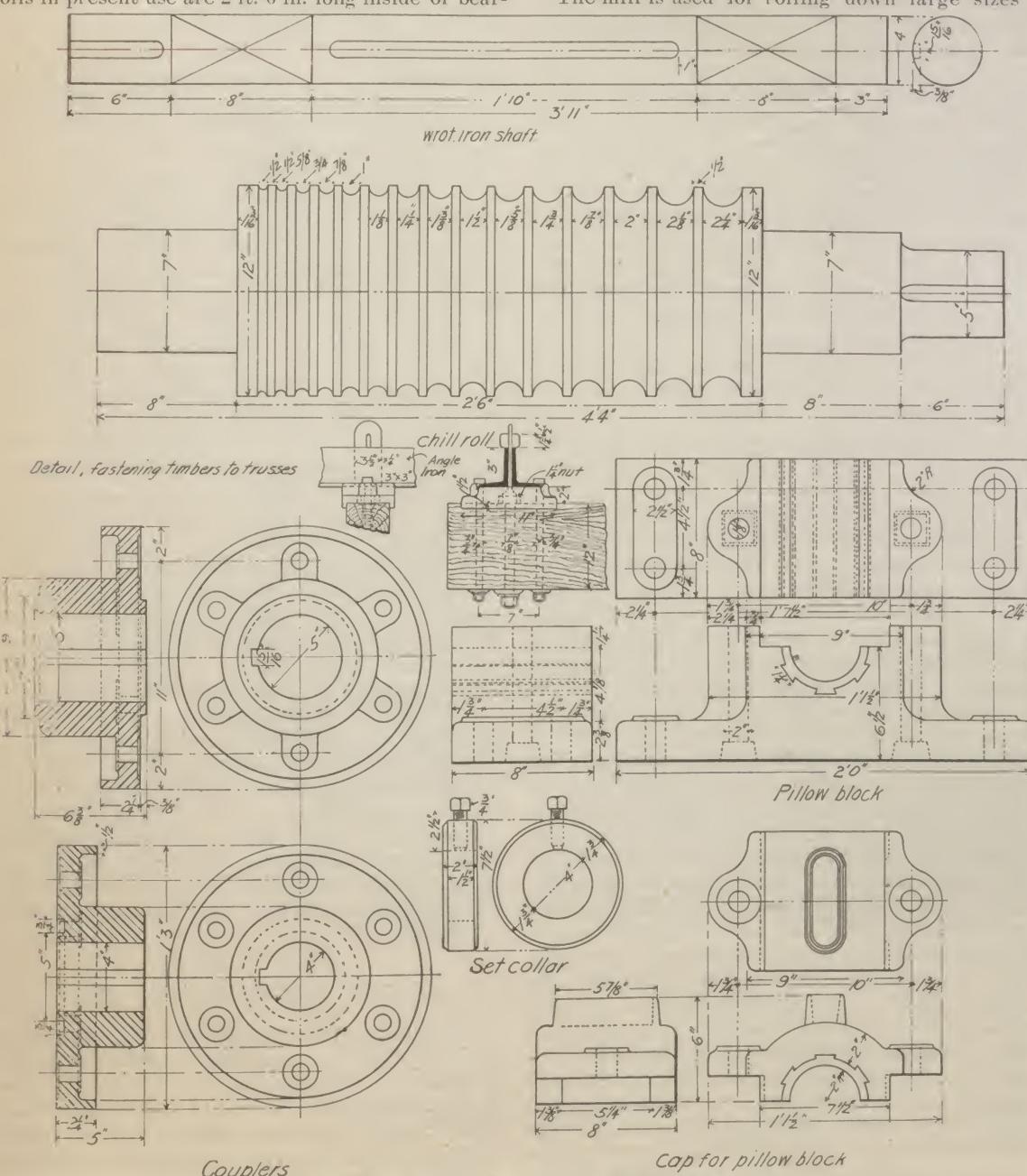


FIG. 3.—SOME DETAILS OF THE MILL.

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CHICAGO, SATURDAY, JAN. 18, 1896.

IRON and steel interests regard with satisfaction the increasing probabilities of the reorganization of some of the leading railway properties, through a scaling down of indebtedness. The year has opened to mill men encouragingly. Pig iron production has turned downward, prices have been reduced, production is being curtailed, and adjustments are being effected looking to the steadiness of prices. Steel billets have touched bottom and large buyers have appeared in the market purchasing cautiously for the present. Failures are by no means improbable in the iron trade in the next few months, unless the anticipated requirements of railroads are presented within a reasonable time. More steel and iron are being made than melted, but the financially strong concerns will accumulate material in view of the possibility of a widening demand in the early spring.

THE South Carolina Constitutional Convention, as is not unusual with bodies of that kind when dealing with subjects with which they are not familiar, has adopted a section forbidding railroads to make freight rates conditioned upon the giving of a release by the shipper. While not assuming to pass upon the constitutionality "of such a constitution it may be in order to remark that the people of the state may enter an emphatic protest when they find their right of contract has been infringed. Presumably the convention sought to protect the shippers from any liability of exorbitant rates on articles usually carried under a release, but if allowed to stand the result will be the striking out of the release rate, thereby subjecting shippers to an advanced rate without relief.

SENATOR CHANDLER, of New Hampshire, is authority for the statement that no pooling bill can pass the senate this session. This ought to be good news for the advocates of such a measure, if the accustomed inaccuracy of the prognostications of that gentleman are to be considered, whatever may be the perspicacity of the Senator from New Hampshire upon other matters, it is apparent from his recent utterances that when he comes to the question of railroad pooling his mentality is altogether at fault. Probably no better advocacy of the bill could be desired than the persistent and prejudiced opposition of this gentleman, for on the presumption that he would naturally follow the same line of argument that he has recently employed, nothing would be easier than to show that his entire opposition was based on misapprehension and misstatement—a class of opposition from which there is nothing to fear.

A RECENT case in southern Illinois has brought up an interesting question in connection with the rights of passengers to choose their routes of traveling. It has long been a disputed question as to whether shippers possessed the right of direction as to the lines employed in transporting freight, but it has been commonly understood that a passenger, being able to move of his own volition, could go where he pleased. The case in question was brought by a passenger who purchased a ticket at Buffalo, via the Lake Shore and Big Four roads, to St. Louis, intending, however, to stop at East St. Louis, through which point the Big Four was accustomed to go in reaching St. Louis. At this particular time, however, that road had changed its route, crossing the river via the merchants bridge from Granite City, Illinois, a short distance north of East St. Louis, thereby compelling the passenger to recross the river to reach his home. Because of the delay thus occasioned, and the bridge

toll he was compelled to pay, he obtained judgment for three hundred dollars. The case will be appealed, but it nevertheless presents an interesting controversy. The purchaser when buying his ticket stated that he wished a ticket to St. Louis via the Lake Shore and Big Four roads. No contract was entered into to carry him via East St. Louis, although it is possible the ticket handed him bore a coupon reading from Cleveland to that point. That, however, does not constitute a contract, the coupons of a ticket being employed for purposes of accounting between the railroads rather than the expression of any obligation of the railroad to the purchaser. It would seem to be hardly open to debate that a railroad company has the right to carry passengers to contracted destinations by such routes as may be most convenient to itself, provided such destination is reached without unnecessary delay. If a contract includes in its terms certain intermediate points there would of course be no questions as to the obligations of the company, but in the absence of such terms it is scarcely possible that a higher court will confirm the finding of the jury in the case here referred to.

A WRITER in the Popular Science Monthly for January discussing the question of profit sharing, uses De Tocqueville's epigram, "Every honest occupation in the United States is honorable," and proceeds to show, as has been shown hundreds of times before, that capital and labor are of equal importance and wholly interdependent. Like many another writer of the day upon the labor question he fails to indicate the underlying cause of the prevalent discontent. It is without doubt true that "every honest occupation in the United States is honorable," but the trouble is that it is also true that every (so-called) honorable occupation in the United States is not honest. The laboring man does not stop to reason it out, but when he sees other men acquiring in a few years fortunes beyond the possibility of the fruit of what he conceives to be honest effort—that is to say, effort which returns value received for what it gets—he cannot fail of being impressed with the idea that something is wrong, particularly when his utmost efforts fail of bringing to him more than the bare necessities of life. And it is in the railroad field that he finds the most glaring instances of this accumulation, and who can blame him if, in view of the many fortunes speedily acquired through speculation and manipulation, he fails to discriminate between moral and legal rights and wrongs. It is probably true that thus failing to discriminate he would be as ready to voluntarily profit by existing conditions if opportunity offered, but that does not in any degree mitigate the sense of disparity under which he now suffers. He also fails to distinguish between railroad operation and railroad speculation, between the business of transportation and the so-called business of dealing in securities as at present conducted, and hence on occasion he manifests his dislike of the one by striving to injure the other. It may be considered as at least doubtful if in the solution of the labor question any real progress has been made during the last nineteen centuries that was not based upon the principles proclaimed by the Man of Nazareth, and it is no doubt true that the more nearly our plans for the amelioration of present conditions approximate his teachings, the more successful will they be.

IN his presidential address at the recent banquet of the Western Society of Engineers Mr. J. F. Wallace of the Illinois Central Railroad spoke of the work of civil engineers, in a very suggestive way and asked the question as to what engineers are here for. His point was that engineers instead of considering their works as being in a sense monuments to their skill should rather consider the practical value of their productions for meeting the requirements which they were intended to serve. The railroad engineer should therefore have continually before him the fact that railways are for the purpose of hauling freight and passengers. And the fact should not be lost sight of that his work is best done which provides the means for carrying out this purpose at the smallest expenditure of money. This principal has been prominently before the men who built the roads of this country, with the result that our systems are the largest and that our country's development has been the broadest and most rapid in the world. Reports which are brought here by engineers who have visited European countries would seem to indicate that by some at least a regret is felt that the great works of engineering which characterize European railways are not also to be found in this country. While admitting that handsome masonry and kindred works are not only pleasing to the eye, but give a pleasant impression of the abilities

of their builders, the fact remains that the whole railway system of this country is a monument to the skill and discernment of the engineers who built them, than which we cannot conceive of a more satisfactory form of monument which could be erected. The question therefore is well put, "what are we here for?" and the answer has been most satisfactorily given in the work which has been done by our engineers. Mr. Wallace's remark was evidently intended to apply especially to civil engineers, but is it not equally applicable to the men who are engaged in furnishing motive power? It is unquestionably good engineering to design locomotives which will approximate to the evaporative standards set by the highest types of boilers and engines in other forms of service, and while American locomotives may not follow such fine lines of engineering as those of foreign countries, we can look with pride at the records which are obtained here in regard to the number and size of trains hauled. Engineers are here for the practical results which they may produce, and that engineering is best which serves the purpose of producing the most for the least outlay regardless of these fine points of engineering which are desirable perhaps, but which do not necessarily increase the returns upon investments.

THE report of the committee of twenty-one, consisting of three representatives from each of the six railway clubs, and three representatives of the private car lines which was appointed to arrange a revision of the rules of interchange for the consideration of the Master Car Builders' Association at the next convention will be found on another page of this issue. Considerable space is given to this report because of its importance and while it may be changed materially in consequence of the discussions before the different railway clubs, it seemed desirable to have this matter fully on record for convenience of reference thereto in the future. The work of the committee has been carefully done, and the rearrangement of the code of rules in accordance with the suggestions made by the Southern and Southwestern Railway Club is a great improvement as the subjects are put in logical order. First comes the general statement which puts this code squarely upon the basis of the Chicago interchange. The words "running repairs" are inserted in Rule one, in regard to the care each company is required to give to foreign cars, and the general principle of inspection for safety is plainly stated in Rule two, which says that cars offered for interchange should be in safe and serviceable condition, and that the receiving road is to be the judge of this. Following the general statement is a series of instructions for inspectors under Rule three. Rule four covers instructions to repair men. The new repair cards shown in another column have been added to this part of the work and this seems to be an excellent idea as it provides a means for notifying car owners of repairs that have been made to their cars giving the reasons therefor. The stub of this card is torn off and sent to the car owner by the road doing the work, while the card itself is attached to the intermediate sill of the car. The instructions for billing are all included in Rule six, and under miscellaneous items, Rules six to twelve, cover the items not properly belonging to the previous classification. The idea of dividing the rules into sections is a good one, and should materially assist in the intelligent use of the code. What sort of treatment will be accorded this report by the railway clubs it is impossible to predict, but there are some directions in which more complete explanations than are given will unquestionably have to be made in order to avoid misunderstandings. This applies particularly to those portions of Rule three, which refer to simultaneous damage. A statement might be advantageously added which would make clear exactly what simultaneous damage means. There may be many who will not agree with the committee in regard to the adoption of the Chicago interchange, but if found necessary, only a few changes will be required to put the rules upon a different basis in this respect. The main part of the work of the committee has been needed, namely, that of rearranging and classifying the rules and that will without doubt stand regardless of changes in the details of the code.

AIR COMPRESSION WITHOUT COST.

A great deal of attention has recently been given to the application of pneumatic appliances in railway shops, until the consumption of power for small tools and hoists, both large and small, has become a considerable item which must be taken into consideration in arranging a power plant. The easiest way to furnish compressed air and that which is most

generally employed at the present time is by fitting up one or several locomotive air brake pumps, which are proverbially wasteful in this connection. One master mechanic has realized this fact and believed that he would save all expense connected with air compression by rigging up a power compressor operated by the shafting of the shop. There is no doubt that power compressors can be and are made to be to a high degree economical and satisfactory, but there is a great danger in jumping from the frying pan into fire by such a makeshift contrivance as was the one referred to and which was said to compress air absolutely without expense to the road. In the first place the change from air brake pumps to still more crude contrivances is undoubtedly a mistake, and incidentally the claim which was made that the power pump cost absolutely nothing to run is a commentary on the usual methods of keeping track of the cost of railway shop operation. A power compressor which costs nothing to run will find a ready market, and while it is certain that pneumatic power distributed generally about a shop is cheap even if somewhat wastefully produced, master mechanics would do well to look to better and cheaper methods of compressing air and should apply some of the same thought and care to this form of power production given to that upon the locomotives. A large compressor requires a great deal of steam and whether operated directly by boiler steam or by shaft power the cost cannot safely be neglected.

Because it is difficult to separate and isolate the cost of air compression from the other operating expenses of the shop is perhaps all the more reason for watchfulness in this matter. It unquestionably will not pay to install expensive and refined, high grade air compressors in comparatively small shops, but the large demand for compressed air in even moderate sized plants seems to require better methods than those which have been referred to. The air brake pump consumes from five to ten times as much steam for its work as would be required for the same amount of compression performed by a properly designed compressor.

There would seem to be a middle course in which the extreme of wastefulness may be avoided and a substitute provided which will do well enough until the increase demand for air necessitates the installation of a machine of the highest grade. There is evidence of a tendency toward paying better attention to economy in the production of this power but closer watching of the matter is in order. There has been almost no thought given to the economy of motors for using compressed air, as these devices are being built in the various railway shops, and while these machines which have been appropriately called "air chewers" as well as the pumps should come in for a share of good attention there are other directions in which very little care and almost no expense the average air plant may be greatly improved as to efficiency.

The application of air apparatus and tools in railway shops has been carried on in an experimental way in many cases without the officers having had the remotest idea of the vast number of uses to which it would eventually be applied, and as the fields of usefulness opened up it was found necessary to keep pace with the additional demands by putting in more pumps. In many places this has been carried as far as it can be with the small units employed and there is therefore a demand for not only better compressing machinery, but also it has become necessary to look after all the small items which may be made to contribute toward getting all the work possible out of the existing plants. In visiting railway shops the inlets for the pumps or compressors are almost invariably found to open into the engine room in which the compressors are located. In one case quite a large compressor was found placed upon a foundation which was very near the wall of the building. It was so near this wall that there was no room for a passage between it and the wall. The inlet pipe opened into the room in which the atmosphere was always warm, and it had not apparently occurred to the men who arranged the plant to provide a short addition to the inlet pipe which would lead to the cooler air outside of the building. In this case a piece of tin tubing eighteen inches long which would pierce the brick wall would have led to the outer air, which might be obtained in the hottest summer weather at a temperature from twenty-five to thirty degrees below that of the engine room. It does not seem to be generally known that a saving of one per cent, or an increase in efficiency to that extent, would follow a reduction of each five degrees in the temperature of the free air taken into the compressor. Certainly the advantage to be gained in this is sufficient to warrant a great deal of extra piping. This is

an economy possible of attainment with almost no expenditure and is therefore one of the best which can be made at any time. An improvement of from four to five per cent may be obtained in this way in a great many plants, and this in some cases would be equivalent to the addition of another pump or an increase in the size of the compressor. Pneumatic power transmission for many reasons is especially well adapted for use in railway shops, and it possesses some advantages over electricity or any other form of transmission. Its wonderful development is abundant evidence of this, but a caution against neglect of the best means of compression and the correct use of air seems appropriate as it is thought that many master mechanics are misleading themselves as to the actual cost of this power.

RAILWAYS AS MANUFACTURERS-

In a list of questions issued some time ago by the vice president of one of the trunk lines addressed to the officers of the motive power department with a view of improving the methods of handling work in every direction, was the following: "Are you making anything at the shops that may be purchased cheaper, and are we using any material bought from outside parties which we can make cheaper than we can buy?" It is much easier to ask than to answer this question, yet it is one which should be considered carefully in every shop. It involves the entire question as to the advisability of railways entering into the business of manufacturing, and this is one of the things which must be kept in sight continually in order to avoid making mistakes. Because the cost of freight charges as well as general charges for depreciation on shop and equipment do not ordinarily appear in the accounts of the motive power offices, it is easy to neglect these items in figuring the expense of manufacturing articles in railway shops, and this fact has led some people to declare that railway companies cannot afford in any case to enter the field of manufacturing. It is argued that these charges, if added to the actual cost of manufacturing would in most cases bring the total up to more than the prices which could be obtained from outside parties. It is also argued that the business of railways is properly and only that of transportation, from which the conclusion is drawn that the roads are going out of their way if they take up work of this kind.

This subject was made the topic for discussion at the November meeting of the New York Railroad club and arguments were presented both for and against manufacturing by the railroads. Some of the members had found it necessary to throw all the labor out of their shops which they could possibly have done elsewhere, finding the question to be one of capacity of the shops. Others had found difficulty in prompt production of material manufactured at home, and had found that specialties, such for instance, as tapped nuts, could be bought cheaper than they could be made. One member stated that railway companies should give up manufacturing articles because their tools were becoming antiquated and were not up to the requirements found necessary by outside manufacturers. A prominent member thought that the roads should help the manufacturers by purchasing instead of making articles. Another argued that the railway shops could afford to do a certain class of work because it could be better done under the supervision of the shop officers than if the purchasing agent should have it done outside. There are many more arguments which might be used upon either side of the question, but these are interesting, as they are the personal views of a number of well known men.

It is without question unadvisable for railroads having small and crowded shops which are inadequate for the work required in connection with repairs, or for roads requiring but small quantities of material to undertake to manufacture for themselves. This, however, is entirely a question of dollars and cents, and must be settled upon strictly business principles. It involves a consideration of the interest on cost of tools and machinery, real estate and buildings; also the geography of the situation must be taken into account. The location of some roads requiring large quantities of certain materials, is such that it will unquestionably pay to enter into manufacturing providing the necessary equipment therefore is provided and other facilities are available. Antiquated shops and methods cannot be used to manufacture cheaply, but with good "up-to-date" equipment there seems to be no reason why in some cases the roads should not be able to save themselves the profits which are made by manufacturers. This is all they can save and as a general rule is more than is accomplished in the majority of cases. It some-

times is a good thing for roads to take up manufacturing because when brought in this way into competition with contract and other shops, the necessity for the employment of improved business methods in shop work is more readily appreciated. This question is not sufficiently considered and when discussed the arguments advanced show that some of the shops are not keeping up in improved methods in any way comparable to that found necessary by private firms.

One field for what might be called manufacturing which is open to all railways, is in working over scrap material, and in connection with this there can be no doubt as to the advantages to be derived. An example of a manufacturing plant which undoubtedly can be made to be an excellent money saver is the rod mill of the Chicago, Milwaukee & St. Paul Railway which is illustrated in this issue. Where there is a large supply of large rods such as is obtained from Howe truss bridges when they are renewed with iron structures or in kindred ways, a plant of this kind can be kept busy to excellent advantage. The kind of manufacturing that does not pay is that spoken of by the committee of the Master Mechanics' Association appointed to investigate the utilization of scrap material, in the report of the 1895 convention of the association. It was stated that one member had found that the cost of some hand hammers, made of old tires, was eight dollars and ninety-eight cents per dozen against four dollars and a half per dozen which was the cost of new hammers purchased outside. This seems absurd, but it is more than probable than much manufacturing is carried on some such basis without the discovery being made that the road is losing money. The discussion of the subject by the New York club is timely, and it should be continuously supplemented by every master mechanic with his foremen. This whole matter is one which should not be undertaken blindly. It should be taken up only after a comprehensive examination of the facilities and the demand for the manufactured material. It should also be borne in mind that it is ordinarily more difficult to get rapid work from railway employees than from men employed in manufacturing establishments where the costs and leaks are as a rule much more closely watched for and guarded against.

OIL FUEL FOR LOCOMOTIVES—LOS ANGELES TERMINAL RAILWAY.

The use of oil fuel upon locomotives has been frequently commented upon in these pages and as there has been comparatively little data published to show the relative cost of oil and coal for fuel, the figures presented here in connection with the experience upon the Los Angeles Terminal Railway will be of interest. The application of oil fuel to the locomotives upon this road has been found to be highly successful and from the fact that oil is obtained within the city limits of Los Angeles the fuel is procured with a great advantage over coal as to cost. The first locomotive to be converted into an oil burner was a Baldwin eight wheel passenger engine and was fitted with the Holden burner, such as is used so successfully on the Great Eastern Railway of England. This engine has 18 x 24 in. cylinders, 60 in. driving wheels, 17 square feet of grate surface, a fire-box 34 x 72 in. at the grates, 1,149 square feet of heating surface, and 211 flues, each 10 ft. 11 in. long and 2 in. in diameter. The boiler pressure is 150 lbs., the weight on drivers 58,000 lbs., the total weight 92,000 lbs. and the total weight of the engine and tender loaded is 162,000 lbs.

The Holden system was fully illustrated in the RAILWAY REVIEW of December 29, 1894, as applied under Mr. Holden's supervision, and this general arrangement has not been materially departed from in the application at hand. The Los Angeles locomotives have the fire brick lining upon the sides as well as the front of the fire-box, and a 2 in. air space was provided to prevent the burning of the sheets. The burner illustrated on page 735 of the issue referred to, consists of three concentric tubes, the inner of which admits air to the flame, the annular space between the inner and intermediate tubes admits the steam, and the oil passes through the space between the middle and the outer tubes. The three spaces open into a combining tube where the steam, oil and air become thoroughly mixed before passing into the fire-box. The flame is projected horizontally across the fire-box against the brickwork and the ends of the nozzles are so arranged as to distribute the flame as evenly as possible over the box. There are two burners for each engine as used in the application by Mr. Holden, and these are placed below the deck where they project into the fire-box through large tubes in the water leg. The grates are covered over with brick from the rear of the box to within 18 in. of the front end where a space of 18 x 24 in. is left uncovered in order to admit air for the combustion of the gases. The arrangement of the brickwork in the fire-box may easily be made such as to prevent all trouble from leaking due to excessive expansion

and contraction of the fire-box sheets. The supply of oil, 23 $\frac{1}{2}$ barrels, which is equivalent to seven tons of coal, is carried in the coal space of the tender. The oil tank is fitted with steam heater coils and is arranged so that an air pressure of about seven or eight pounds can be carried upon the surface of the oil. The heater and the air pressure were found necessary while using heavy oils. The deflector and wire netting were removed from the front end and the nozzles were reduced from 3 $\frac{1}{2}$ in. to 3 in.

The trial made with the first locomotive which was equipped for oil burning, was so successful that it was decided to convert all of the eight engines belonging to the road over into oil burners, and the comparative performance before and after the change are presented in the two tables herewith. The sheet for January, 1895, shows but one engine using oil, and that for August gives the performance of the same engines when burning oil. Mr. George B. Leighton, president of the road, and to whom we are indebted for this information and the performance sheets, says that he finds no shortcomings in oil as a locomotive fuel, and that its superiority over coal is most apparent where the road is undulating, requiring frequent opening and closing of the throttle. The engines can also be worked to greater capacity with oil than with coal, and the regulation can be made with great nicety, the heat may be immediately regulated to conform with the consumption of steam in the cylinders. The January record is good, but the men had hardly become accustomed to handling the oil at that time. Mr. Leighton says that the report for November, 1895, shows an expense for fuel of but .0677 cents per locomotive mile.

The cost of converting the engines for oil burning will be of interest.

Lining for fire-box	\$ 15.25
Holden burners (2 at \$75.00)	150.00
Tanks and fittings for oil	74.24
Fittings and piping	10.97
Labor	107.72
	358.18

These figures are higher than they would be where material and labor are cheaper. Experiments to ascertain the relative evaporative efficiency of oil and coal were made with great care and showed an evaporation of from 11.73 to 12.4 lbs. of water per pound as against 6.2 lbs. of water per pound of Wellington coal. The lower rate of the oil bears the relation of 3.3 barrels of oil at a cost of \$4.19 to a ton of coal

L.A.T. 11.

Performance Sheet
January 1895.

Train Miles		Car Miles	Oil & Waste			Repairs			Cost per mile	Cost of fuel	Cost of Engrs Fuel Wipers & Disp	Cost of Engrs Freemen Wipers & Disp	Total Cost	Cost per Engine	Coal in lbs. per car	Pints of oil per car	Ft. of oil per car			
Eng.	Poss.	Fret	Work	Such	Total	Eng.	Cyl.	Lit.	Sug.	Waste	permile	Material	Labor	Total	per mile	per mile	per mile			
						P	5362								P	286				
						F	555								F	11.4				
1	2460	88	150	2698		F	55917	66	41	2	5	7.4	98	.0018	8.28	5.45	13.75	.0051	160284	
						2554									GAS	20	20	20	20	
						596									10.29	10.29	10.29	10.29	10.29	
2	1454	32	900	2366		3150									10.27	10.27	10.27	10.27	10.27	
						6594									10.745	10.745	10.745	10.745	10.745	
						710														
3	2976	75	3051	7304		165									864	98	3205	594	7	
						3251														
4	108	344	452	3416		1115														
						10198														
5	567	544	32	171	1514	11913														
						6458														
						3950														
6	2993	96	638	3727		10408														
						385														
						95														
7	193	30	223	478		6610														
						600														
8	2954	122	3076	7410		29243														
						20753														
						13685														
						888	248	2086	16907	49996										

L.A.T.R.
Performance Sheet
August 1895.

Train Miles		Car Miles	Oil & Waste			Repairs			Cost per mile	Cost of fuel	Cost of Engrs Fuel Wipers & Disp	Cost of Engrs Freemen Wipers & Disp	Total Cost	Cost per Engine	Gas of oil per car	Gas of oil per car	Pints of oil per car	Ft. of oil per car		
Eng.	Poss.	Fret	Work	Such	Total	Eng.	Cyl.	Lit.	Sug.	Waste	permile	Material	Labor	Total	per mile	per mile	per mile			
						R	1248								R	240				
						F	57								F	96				
2	644	165	809	1305		4496	27	16	4	1	6.1	95	.0014	72.98	13.95	20.82	25.53	5067		
						338									GAS	25	25	25	25	
						18469									14	20	0.84	299.33	3700	
3	2228	408	2636	4934		11469	84	51	2	22	5.90	0.022	7.80	34.45	41.85	0.15	12213	191	91	
						164									0.78	157.95	0.59	397.81	1508	
4	4151	140	4291	18469		13021	191	81	1	14.8	86	.0020	34.77	61.25	96.02	0.22	26151	41	39	
						8041									0.51	220.59	220.59	410.30	410.30	
5	54	1329	390	1723	13185	4407	78	62	6	3	9	5.78	.0032	10.88	15.70	26.80	0.15	12370	194	40
						12448									0.82	108.6	142.20	250.82	336.96	
6	2240	275	210	2725	12448	1877	172	54	10	6.69	0.028	113.58	50.90	164.48	0.0605	17305	272	92	1001	159.50
						5400									0.54	159.50	0.58	236.31	236.31	
						877														

force it around so it will clear the tail end of the knuckle, unlocking it. A further movement of the crank causes a button or lug on the second arm of the unlocking device to come in contact with a cam shaped cavity on the lower side of the locking arm and force the knuckle into an opened position. When the knuckle is open and the lock down a very small force applied to the knuckle will force the lock up and its own weight brings it back into place locking the knuckle in a closed position.

The crank for unlocking and opening the knuckle is operated by a small light rod, and as the work it has to perform is very slight indeed there is little or no danger of its getting broken or inoperative. The simplicity and cheapness of the lever and the ease with which it operates are among the claims for superiority made by the owners of the bar. The rod hangs in two stirrups attached beneath the end sill of the car and requires no stops or locking attachments. Should the bar pull out, the stirrup will, it is claimed, catch the lever, unlock the knuckle and thus prevent the bar from falling on the track. In addition to this it is claimed that the bar will do all that any other bar will do and more than most of them. It has only two parts aside from the bar, knuckle and unlocking attachments. It can be unlocked while in close contact with another bar without first pulling apart the cars to which they are attached. A feature of the design to which attention should be called is the strengthening of the guard-arm by the webs shown in Fig. 1 which is carried back upon the outside to reinforce the ribs at their junctures with the plate of the guard-arm. Messrs. E. N. Gifford and Wm. Gilchrist should be addressed for further information at Room 506, Major Block, Chicago.

The National Association of Manufacturers will hold its second annual convention in Central Music Hall, Chicago, on January 21, 22 and 23. This association is the outgrowth of an agitation by some of the principal manufacturers of the United States for concerted action for the purpose of pushing their business at home and abroad. Among the principal promoters of the plan were Thomas P. Egan, of Fay-Egan Co.; Robert Laidlaw, of the Laidlaw, Dunn & Gordon Co., and Charles Davis, of the (at that time) Lodge-Davis Machine Tool Co., all of Cincinnati. As a result of their efforts, assisted by manufacturers in all parts of the country, a convention was held in Cincinnati one year ago, and a permanent organization was effected. The objects of the association are to promote all things that concern the interests of the members individually or collectively, such as a protective tariff, reciprocal trade with foreign countries, and other national movements of importance to their interests. The present officers of the association are: President, Thomas Dolan, of Philadelphia; treasurer, Robert Laidlaw, of Cincinnati; secretary, E. P. Wilson, of Cincinnati.

NOTICES OF PUBLICATIONS.

MALLEABLE IRON CASTINGS FOR RAILWAY EQUIPMENT. A Catalog of Malleable Iron Castings Manufactured by the National Malleable Castings Co. of Cleveland, Chicago, Indianapolis and Toledo. 1895. Standard size, 6x9 in.

This catalog is issued with a view of putting illustrations of parts of railway cars which are produced by this company in malleable iron before the car builders and other railway officials in a condensed form for convenient reference, and also to meet the demand for information with regard to the advantages of the use of this material in car construction and railway equipment. In the introduction to the catalog, the statement is made that by the use of malleable iron castings in the place of cast iron, stronger, lighter and more durable parts are secured at a reduction in weight of from 40 to 50 per cent, and this saving in weight makes it possible to produce the castings at about the same first cost as would be required for cast iron. As a substitute for wrought iron forgings, equal strength in many forms is obtained without greater weight. The statement is made that wherever malleable iron castings have been applied to cars the anticipation of greater durability and consequent lessened expense incident to delays and repairs have been fully realized, and that this is supplemented by continuous economy and service effected through a material reduction in the weight of the cars. The articles shown in the catalog were selected from patterns in use, with a view of fulfilling the object above stated, and though a large number of them are shown, this must not be considered as more than a representative collection. Among the articles to which special attention is called are the following: The Tower Vertical Plane Coupler, the National Car Door Fastener, the National Center Plate, the National Journal Box and Journal Box Lid, the Eubank Car Door Fixtures, the Eubank Burglar Proof Car Door Bracket, and Coffin's Carline, Sill and Brake Block Pockets.

The illustrations of castings occupy 103 pages, and are with few exceptions, excellent half-tone engravings, of which there are a greater number in this catalog than we have seen in any collection previously published. Beside being furnished with an excellent index the work is arranged upon a well defined plan which divides the parts into four groups, the first of which includes the articles pertaining to trucks. The second includes castings pertaining to the bodies of cars, the third concerns locomotive castings, and the fourth miscellaneous articles such as levers for special purposes, washers and tools. A convenient and elastic classification of the parts is employed which is thought has not been used before in catalogs of this description. The first group, or truck material patterns, are all numbered in such a way as to designate by

the number that the parts belong in the general division of trucks, and also the special group is designated. For instance, casting 101 is a Standard Journal Box, 201 is a Journal Box Lid, 301 is a Journal Box Wedge. There are therefore spaces in the classification for 99 patterns of each class, and as this plan is carried on throughout the work the number of the pattern given in ordering at once identifies the article. This systematic classification, together with the index and the general information which is given as to dimensions under each of the illustrations, render this catalog very convenient. The letter press and binding are good, and the book seems to fulfill its object admirably.

"The Maine Central" for January comes out with a fine new cover designed by Miss Amy Richards, a daughter of General John T. Richards, of Gardiner, Maine. This new cover is an artistic combination of rich Roman lettering on an ornamental background of pine cones, the State of Maine's floral emblem, and was selected from a number of competing designs. This number is devoted to Bar Harbor, and the interesting article on that famous resort is made more attractive by new and artistic illustrations of the Kebo Valley Club, Steamer Sappho, Off Porcupine Island, Twenty Mile Drive, Bird's Eye View of Bar Harbor, Green Mountain, The Porcupine, The Malvern, The Tow Path, Carey and Grant Cottages, Emery Cottage and its magnificent hall, Bar Island, Balance Rock, and a new view of Bar Harbor. Hon. J. H. Drummond continues his history of the Maine Central Railroad, Fly Rod has a column for sportsmen, and Mr. Kimball presents his unique "hotel" and "drummers" notes. Mr. S. W. Royal, assistant roadmaster, is the railroad official whose portrait is presented, and there is also one of Mr. N. B. Dana, of the Boston & Maine. Prominent among the features of this number is a fine full page map of the Maine Central and its connecting lines, an addition which will prove of great value to the traveler. Railroad notes, the time tables of the Maine Central, Boston & Maine, and Bangor & Aroostook Railroads, Pullman schedules, game notes, and a few well selected poems and jokes complete the number.

An errata slip has been received for Kent's Mechanical Engineer's Pocket Book. This will be sent free to any address upon application to the publishers, Messrs. John Wiley & Sons, 53 East Tenth street, New York.

PATENTS ON RAILWAY APPLIANCES.

[The following list of patents granted for inventions relative to railroad appliances for the week ending January 13, is reported especially for the Railway Review, by Chas. L. Sturtevant, patent attorney, Washington, D. C., from whom printed copies can be obtained for 15 cents each.]

Carlson, Charles, Deer Trail, Col., car coupling, 553,207.
Cliff, Edward, Newark, N. J., car truck, 553,104.
Cliff, Edward, Newark, N. J., assignor of one-half to G. R. Joughins, Berkley, Va., freight car truck, 553,103.
Davis, Moses J., San Antonio, Tex., assignor of one-fourth to H. J. Davis, Pueblo, Col., locomotive head light, 552,989.
Facer, James A., assignor to Facer Forged Steel Car Wheel & Locomotive Wheel Co., Philadelphia, Pa., machine for forging car wheels, 553,156.
Grabill, John D., assignor of one-fourth to M. C. Price, Roanoke, Va., combined stock and box car, 553,193.
Kallam, Luther W., Martinsville, Va., railway car truck, 553,068.
Long, Timothy, Cleveland, Ohio, car unloading apparatus, 553,122.
MacPherson, Duncan, Montreal, Canada, railway frog, 552,916.
McGonagal, Zora, New York, and H. E. Crilly, Allentown, Pa., cross tie holder, 552,965.
Swofford, Thos. C., Hope, Ark., rail joint, 553,180.
Thompson, James J., Jacksonville, Fla., mechanism for propelling railway velocipedes and hand cars, 553,083.
Warfield, Louis, Detroit, Mich., 553,022.

TECHNICAL MEETINGS.

The American Society of Civil Engineers holds meetings on the first and third Wednesdays in each month, at 8 p.m., at the House of the Society, 127 East Twenty-third street, New York City.

The American Society of Irrigation Engineers. Third annual meeting will be held at Albuquerque, N. M., September 16-19. John L. Titcomb, secretary, 36 Jacobson block, Denver, Col.

The Association of Civil Engineers of Cornell University meets weekly every Friday, from October to May inclusive, at 2:30 p. m., at Lincoln Hall, New York.

The Association of Engineers of Virginia, holds its informal meetings on the third Wednesday of each month from September to May inclusive, at 8 p. m., at 710 Terry building, Roanoke, Va.

The Boston Society of Civil Engineers, meets monthly on the third Wednesday in each month, at 7:30 p. m., at Wesleyan Hall, 36 Bromfield street, Boston, Mass.

The Canadian Society of Civil Engineers meets every other Thursday at 8 p. m., at 112 Mansfield street, Montreal, P. Q.

The Foundrymen's Association meets monthly on the first Wednesday of each month, at the Manufacturers' Club, Philadelphia, Pa.

The International Irrigation Congress will hold its fourth session at Albuquerque, N. M., September 16-19. Fred L. Alles, secretary, Los Angeles, Cal.; local secretary, W. C. Hadley, E. M., Albuquerque, N. M.

The Montana Society of Civil Engineers meets monthly on the third Saturday in each month, at 7:30 p. m., at Helena, Mont.

The New England Railroad Club meets on the second Wednesday of each month, at Wesleyan Hall, Bromfield street, Boston, Mass.

The New York Railroad Club has a monthly meeting on the third Tuesday in each month, at 8 p. m., at 12 West Thirty-first street, New York City.

The North-West Railway Club meets alternately at the West Hotel, Minneapolis, and the Ryan House, St. Paul, on the second Tuesday of each month.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m., at the St. Paul Union Station, St. Paul, Minn.

The Southwestern Society of Mining Engineers will hold a session at Albuquerque, N. M., September 16-19. Walter C. Hadley, secretary, Albuquerque, N. M.

The Southern & Southwestern Railway Club holds its meetings on the third Thursday of January, April, August and November, at the Kimball House, Atlanta, Ga.

The Technical Society of the Pacific Coast has a monthly meeting on the first Friday in each month, at 8 p. m., at the Academy of Sciences building, 819 Market street, San Francisco, Cal.

The Western Foundrymen's Association holds its meeting on the third Wednesday in each month, at the Great Northern Hotel, Chicago, Ill.; secretary, S. T. Johnston, 1522 Monadnock building.

The Western Railway Club of Chicago, holds its meeting on the third Tuesday of each month.

The Western Society of Engineers meets on the first Wednesday of each month at 8 p. m., at the society's rooms, 1736-1739 Monadnock building, Chicago, Ill. C. J. Roney, secretary.

The Central Railway Club meets on the fourth Wednesday of January, March, April, September and October, at 10 a. m., at the Hotel Iroquois, Buffalo, N. Y.

The Civil Engineers' Club of Cleveland, meets on the second and fourth Tuesdays in each month, at 8 p. m., at the Case Library building, Cleveland, Ohio.

The Denver Society of Civil Engineers meets on the second and fourth Tuesdays in each month except July, August and December, when they are held on the second Tuesday only, at 36 Jacobson building, Denver, Colo.

The Engineers' and Architects' Club of Louisville has a monthly meeting on the second Thursday in each month, at 8 p. m., at the Norton building, Fourth avenue and Jefferson street, Louisville, Ky.

PERSONAL.

Mr. Walter W. Hunt has been appointed traveling passenger agent of the Plant System, with headquarters at Tampa.

Circulars have been issued announcing the appointment of Mr. F. H. Crump as assistant auditor of the Southern Railway.

Mr. Charles A. Wickersham has been appointed superintendent of the Alabama Great Southern, with offices at Birmingham.

Mr. C. F. Parkes, heretofore assistant general manager, has been appointed general manager of the St. Louis, Alton & Terre Haute Railroad.

Mr. C. B. F. Palmer has been appointed private secretary to Mr. Aldace F. Walker, chairman of the board of the Atchison, Topeka & Santa Fe Railway.

Mr. Robert L. Pace, who has been secretary to President Smith of the Atlanta & West Point road, has been appointed purchasing agent for that company.

Mr. F. P. Moore has been made second vice president and treasurer of the New York, Susquehanna & Western Railroad with headquarters in New York City.

Mr. La Mott Ames has resigned the superintendence of motive power of the Beech Creek Railroad at Jersey Shore, Pa. He has not yet decided where he will locate.

Mr. W. B. Bend, vice president and auditor of the Chicago Great Western, announces the appointment of Mr. R. F. Malone as ticket auditor, with office at St. Paul.

Mr. Edwin Dunlop has assumed the position of acting superintendent of the St. Louis Merchants' Bridge Terminal Railway Company, vice W. A. Garrett, resigned.

Mr. James S. Nelson was on January 12 appointed receiver for the Sea Beach Railway Co., on application of Messrs. Wm. O. Platt and Wm. Mann to satisfy a mortgage for \$300,000.

Mr. H. J. Hargrave, formerly contracting agent of the Lackawanna Line at Kansas City, Mo., has been appointed contracting agent of the Toledo, St. Louis & Kansas City at St. Louis.

Mr. Remsen Crawford, for the last three years railway editor of the Atlanta Constitution, has been made press agent for the Plant System, with headquarters at Tampa Bay, Florida.

Mr. James Ramsay, heretofore acting lumber agent for Pullman's Palace Car Co., has been appointed lumber agent of that company, with office at Pullman, Ill., effective January 1.

Mr. R. M. Hannaford, who for some time past has been with the Phoenix Bridge Co., has been appointed bridge engineer of the Grand Trunk railway, with headquarters at Montreal, Canada.

Mr. L. R. Pomeroy, late of the firm of Coolbaugh & Pomeroy, of New York, announces that he has been appointed sales agent for the Cambria Iron Co., and the Latrobe Steel Co., with office at 33 Wall street, New York.

Mr. William F. Burns has retired from the finance committee of the Baltimore & Ohio road, on account of failing health, and it is stated in Baltimore that he is also contemplating resigning as director of the company.

Mr. J. W. Cole is appointed traveling passenger agent for the Chicago & Great Western, with headquarters room 911 Carnegie block, Pittsburgh, Pa. Mr. Cole's territory will include Pennsylvania, Maryland, West Virginia and Virginia.

Mr. Chester H. Speers, for the past eight years assistant passenger agent of the Atlantic & Pacific has resigned. It is said that his retirement is caused by failure to agree with his superior officer General Passenger Agent Byrne, at Los Angeles.

Mr. Hiram S. Cable has been elected vice president of the Rock Island & Peoria Railroad, vice Mr. H. Kimball, resigned. The new vice president is son of President Cable, of the Chicago, Rock Island & Pacific road, and manager of the Manitou & Pike's Peak Railroad.

Mr. Don Alexander will be assistant general freight agent of the Chesapeake & Ohio, in charge of the Louisville division, between Louisville and Ashland, Ky., and Big

Sundy division; also the southern and southwestern territory, with headquarters at Louisville, Ky.

The eastern office of the Atchison, Topeka & Santa Fe Railway Co. will be at 59 Cedar street, and will be the address of the following officers: Aldace F. Walker, chairman of the board; John P. Whitehead, comptroller; H. W. Gardiner, assistant treasurer; and L. C. Deming assistant secretary.

The funeral services of Mr. Samuel Irving, late superintendent of car department for the Missouri, Kansas & Texas Railway company, were held at Sedalia, Mo., on Tuesday, Jan. 7. Many were the messages of condolence and expressions of sympathy sent to Mr. Irving's family, showing the high regard in which he was held by all who knew him.

Mr. Thomas Orchard, master car builder of the Pennsylvania division and gravity railroad of the Delaware & Hudson Canal Co., died December 30, 1895, at Carbondale, Pa. Mr. John H. Orchard, formerly assistant master car builder, has been appointed his successor and the latter office abolished.

Mr. J. J. Turner at present superintendent of the Pittsburgh division of the Panhandle has been made vice president and general manager of the Vandalia lines. The appointment becomes effective January 15, and Mr. Turner's headquarters will be at St. Louis, as the offices at Terre Haute are to be moved to that place.

Mr. John Doyle, master car builder of the Missouri, Kansas & Texas in Texas, has been notified that hereafter he will have jurisdiction over that department of the entire system. This is equivalent to promotion to position of superintendent of the car department, made vacant by recent death of Mr. Samuel Irving, of Sedalia, Mo.

Mr. C. H. Goodrich, until recently the general freight agent of the New York & New England Railroad, has been appointed superintendent and traffic manager of the Northern Alabama Railroad by General Manager Samuel Hunt, under whom Mr. Goodrich served as general freight and passenger agent on what is now the Cincinnati, Portsmouth & Virginia Railroad before going to the N. Y. & N. E. Mr. Goodrich will have headquarters at Sheffield, Ala., succeeding Mr. P. Campbell, resigned.

At the recent annual meeting of the stockholders of the Norwich & Worcester Railway Company, Mr. George H. Ball, of Boston, who for eight years has been president, declined re-election to the board of directors. The board was elected as follows: Edward L. Davis, Thomas B. Eatou, Josiah H. Clarke, Francis H. Dewey and A. George Bullock, all of Worcester; Charles Cogswell, of Norwich; William T. Hart, of Boston; Edward C. Thayer, of Keene, N. H., and Stephen Salisbury, of Worcester; At the directors' meeting A. George Bullock was elected president, and M. N. Whittemore secretary and treasurer.

Mr. George B. Reeve, traffic manager of the Chicago & Grand Trunk Railway, with headquarters at Chicago, since 1881, has left that position to become general traffic manager of the entire Grand Trunk system, with headquarters at Montreal. Mr. Reeve was born in England in 1840 but first entered railway work in this country and with the same road he now serves. Although a man of strong convictions and indomitable will he is also fair minded and willing to concede much for the sake of harmony, qualities which have contributed much to the strong position achieved and maintained by the Grand Trunk. His fight against the so-called uniform bill of lading was a good illustration of his readiness to protect the rights of shippers and won from them high regard. Mr. Reeve will carry to his new position the good wishes of his friends and associates alike.

Mr. Frank L. Parker, formerly a well known railroad man, but who for the past three years has been engaged in private business, died recently at his home in Worcester, Mass., after a brief illness. Mr. Parker entered railway service in 1866 with the Vermont Central Line at Boston. In 1878 he was made secretary to the vice president and general manager of the Atchison, Topeka & Santa Fe, and later in the same year was made assistant general freight of the same road. In 1879 he went to the Fitchburg as traffic manager, holding this position until 1881 when he again went to the Santa Fe as assistant to the president. In 1892 he was made general freight and passenger agent of the Northern division of the Mexican Central with headquarters at Paso del Norte, and in 1885 he was made general freight and passenger agent of the same road. In 1866 he went with Erie Despatch Fast Freight Line, going later to the Great Northern as general freight agent, which position he retained until his retirement from railway work.

At a meeting of the board of directors of the Pennsylvania Co. and the Pittsburgh, Cincinnati, Chicago & St. Louis Railway Co., held on January 14 at Philadelphia, the following changes and appointments were made: Joseph Wood resigned as general manager and was elected fourth vice president of both companies; L. F. Loree was appointed general manager of both companies; W. H. Sciven was appointed superintendent of the Cleveland & Pittsburgh division, vice Loree, promoted; L. L. Gilbert was appointed assistant counsel of the Pennsylvania Company; M. J. Becker, resigned as chief engineer of the Pittsburgh, Cincinnati, Chicago & St. Louis, and was appointed consulting engineer and real estate agent; Thomas H. Johnston was appointed chief engineer, vice Becker, resigned; G. L. Peck was appointed superintendent of the Pittsburgh division of the Pittsburgh, Cincinnati, Chicago & St. Louis, vice J. J. Turner, transferred to the Vandalia lines; Sherman May was appointed superintendent of the Richmond division of the Pittsburgh, Cincinnati, Chicago & St. Louis, vice Peck, promoted; Ralph Peters was appointed general agent at Cincinnati in addition to his duties as superintendent of the Cincinnati division of the Pittsburgh, Cincinnati, Chicago & St. Louis. Joseph Wood, as fourth vice president of the Pennsylvania Co., will be in Chicago, the transportation department, and will aid First Vice President McCrea in the traffic department.

Mr. C. W. Smith, as was predicted several weeks ago, has been appointed receiver of the Atlantic & Pacific Railroad, take effect February 1. On the resignation of the present receivers, Messrs. Walker & McCook, the Atlantic & Pacific bondholders' committee presented the name of

Mr. Smith for appointment as receiver, and the managers of the Atchison, Topeka & Santa Fe united in the request. Mr. Smith entered railway service in 1855 as an agent for the Columbus, Piqua & Indiana. In 1862 he was made general freight agent of the Columbus, Chicago & Indiana Central, and from 1868 to 1870 was general freight agent of the Pittsburgh, Cincinnati & St. Louis, at which time he took the same position on the Central Pacific. In 1872 he was made general manager of the Indianapolis, Bloomington & Western. In 1875 he went to the Chicago, Burlington & Quincy as general freight agent, becoming traffic manager of the same road in 1878. For one year—May, 1880 to May, 1881—he was traffic manager of the New York, Lake Erie & Western, after which he filled the position of general manager of the Chesapeake & Ohio road, for nearly five years. In 1885 he was elected vice president of the same road, and in 1886 was made general manager of the Santa Fe road. Since 1887 he has held positions as general manager of the Atlantic & Pacific, and vice president of the California Southern and California Central roads, but for several years past has not been actively engaged in railway service.

RAILWAY NEWS.

Carolina Midland.—It is reported that the arrangements which have been pending for the sale of the Carolina Midland road to a Chicago syndicate have been completed and that the sale will soon be consummated, probably during the next month. It is expected that the new owners will



GEORGE B. REEVE,
General Traffic Manager Grand Trunk Railway System.

at once build a long and important extension into the mountain district of the state. The road is now 55 miles long and extends from Allendale to Seivern, S. C., and is in excellent condition, laid with 56 lb. rails. The new company will also extend the system 62 miles to Greenwood, and through Abbeville county, and the securities of the road will be greatly enhanced in value by the change of ownership.

Chicago, Paducah & Memphis.—The Chicago, Paducah & Memphis has been completed and in operation for one year, and runs from Altamont to Marion, Ill. There is what is considered a good prospect of an early extension of the road through to Paducah, Ky., which would give the road good southern connection with the Paducah, Tennessee & Alabama, which was recently purchased by the Louisville & Nashville system. The Chicago, Paducah & Memphis is doing a good business in handling coals from the mines along the route, one of which is giving the line about 20 cars per day. Several new shafts are being sunk in the vicinity of Marion, which will increase this output. This line will connect with the Centralia & Chester, which is being built from Centralia to Salem, and also with the new line which is being located between Mt. Vernon and Terre Haute.

Cincinnati & Dayton Terminal.—**Cincinnati, Jackson & Mackinaw.**—The suit to foreclose the mortgage against the Cincinnati & Dayton Terminal Co., brought by parties representing the Cincinnati, Jackson & Mackinaw R. is still in the courts, negotiations to compromise with the stockholders having failed. It is intimated that the stockholders, now that some value seems to be attached to their property by roads seeking a new entrance into Cincinnati, talk of reviving a belt road scheme for which they once had estimates signed.

Cleveland & Pittsburgh.—The Pennsylvania Co. operating the Cleveland & Pittsburgh R. announces the withdrawal on January 12, of the Alliance accommodation a train that for over 40 years has been the principal medium of local travel for a distance of some fifty miles. The run of the Ravenna accommodation, a train reaching Cleveland earlier and departing later, will be extended to Alliance. The train from Cuyahoga Falls, Akron and Orville on the Cleveland, Akron & Columbus that has united with the Alliance accommodation at Hudson, and been an important feeder, has already been taken off because of electric competition. From Cleveland to Bedford some twelve or fourteen miles, an electric road is already in operation.

Duluth, Missabe & Northern.—This railway is distinctively a Duluth road and its tracks do not pass beyond St. Louis county. Only a little more than two years ago the

first train load of ore was brought into Duluth over the lines of the company and dumped on the largest ore dock in the world on the bay front almost in the heart of the city. Ore dock No. 1 belonging to the Duluth, Missabe & Northern was built in 1893, and is 2,304 ft. long, 52 ft. wide and 53 ft. 8½ in. above water. The dock has 384 pockets with a capacity of 150 tons of ore to each pocket. Another dock is now being built which is to be 1,152 ft. long, 52 ft. wide, 57 ft. 8½ in. above water. It will have 192 pockets and a capacity of 180 tons of ore to each pocket. The system to-day comprises 152 miles of track devoted pre-eminently to the transportation of ore. Thirty-one engines furnish motive power for 1,200 ore cars. No new ore cars were added to the equipment during the past year, but an order has just been placed with the Pullman Company for 400 cars to be delivered before May 1, 1896. During the ore shipping season just closed the Duluth, Missabe & Northern Railway shipped 1,598,783 tons of ore to its dock in Duluth where it was loaded on ore boats and transported to eastern markets. In August last in the height of the season some days as many as 25 trains unloaded at the dock and the fact that 400 new cars have been ordered indicates that a great increase in business is expected next season. The road is rapidly building up a paying winter business hauling logs from the pineries on the range to the mills along the water front in Duluth. New connections with the Duluth Transfer Company have enabled the road to benefit the loggers materially by cutting down transportation charges. The past year the road also handled about 11,000,000 ft. of logs, and the coming year calculations are made for hauling 20,000,000. During 1895 extensive improvements were made. Additional tracks in the yards at Proctor Knott cost \$10,000, three new depots were built, eight miles of new 80 lb. rails were laid in place of old 60 lb. rails, 1,183 cars of gravel, or 99,747 cu. yds. were distributed over 62 miles of track for ballast, etc., amounting in the aggregate to about \$175,000 in the way of improvements. It is reported that early next spring this railway company will build machine shops and fully equip them at Proctor Knott at a cost of from \$75,000 to \$100,000.

Intercolonial.—Reports are out to the effect that the Dominion government proposes to dispose of the Intercolonial R. to the two great private railway corporations in Canada, the Grand Trunk and the Canadian Pacific, and that the Grand Trunk R. will secure that part of the Intercolonial between Levis, Quebec and Moncton, N.B., and that the Canadian Pacific R. that part between St. John, N. B., and Halifax, N. S. Should the report materialize, such a move would be bitterly opposed by the people of the maritime provinces, who would be at the mercy of private railway companies, whereas they now have an inter-provincial railroad, partially under their control through their representatives in parliament.

Jacksonville, St. Augustine & Indian River.—Construction on the Jacksonville, St. Augustine & Indian River road for the year 1895 consisted of an extension of the Florida East Coast R., which has been made from West Palm Beach to Miami, 67 miles. The grading is all completed and the track has been laid 30 miles. Bridge work and tracklaying is in progress, and it is expected to complete the road to Miami by February. Also an extension from West Palm Beach to Palm Beach, east to the ocean, a distance of one mile has been built, of which 2,000 ft. is trestle work across Lake Worth. An ocean pier is in course of construction from which a line of steamers will run to Nassau, scheduled to start January 17.

Lima Northern.—Surveyors on the proposed Lima Northern R. were at Wauseon, Ohio, on Monday of this week, having run the line directly from Napoleon during the last week. On the 14th Contractor Strang's gang of graders at Napoleon stopped work, which is due to the fact that more pay must come before work will be resumed. This force constituted about 50 teams and men, who claim that the unfavorable weather is against them, and no more than living expenses can be made.

Louisville, St. Louis & Texas.—A reorganization agreement for the Louisville, St. Louis & Texas has been signed, which it is expected will be put into effect as speedily as possible. Existing mortgages are to be foreclosed, and the property acquired by a new company which will issue \$2,100,000 first mortgage 50-year 5 per cent gold bonds secured by a lien on 165 miles of road and its equipment. The first coupon is payable July 1, 1896. Provision is to be made for issuing \$400,000 additional bonds for extension of the main line to Louisville, or for other purposes. Certificates will be issued representing interests in \$2,000,000 5 per cent non-cumulative preferred stock and \$2,000,000 of common stock. The reorganization committee has appointed three trustees to issue negotiable trustee certificates. Trustees are: John J. McCook, Brayton Ives and Oscar Fenley. One thousand dollars of new bonds are to be given for \$2,000 of the old firsts. The trustees are to issue \$700,000 of bonds to pay off liens and improve property.

Michigan Central.—During the year 1895 several branch lines were constructed consisting of the Dearborn branch, 5 miles in length, running from Dearborn to Oakwood, there connecting with the Wabash and forming a line from Dearborn to Detroit via the Wabash from Oakwood to Delray; Amherstberg branch from the old station to Amherstberg, 1½ miles long; and a permanent siding from Buchanan station to the Buchanan dam on the St. Joe river, 2 miles long. An iron bridge 160 ft. in length, having a ballast floor, stone abutments, and center pier, was built over the Kalamazoo river at Augusta, and at Pokagon creek and Dowagiac creek stone arches each with a 15 ft. opening, were put in. New station buildings were constructed at Fabius, Sandy beach, Rochester Junction, Columbiaville, Delhi, Greenwood, Sheldons and Amherstberg.

Oregon Railway & Navigation Co.—The original plan of reorganization of the Oregon Railway & Navigation company has not received the entire approval of all interested and a change is deemed advisable. It is proposed to amend the plan so that the trust agreement shall terminate absolutely on May 1, 1896, or at least ten years from the sale of the company's property under foreclosure. It is provided that an early termination may be made by the consent of holders of two-thirds of each class of certificates of deposits of consolidated mortgage and collateral trust mortgage bondholders and stockholders, or unless dividends equal to 20 per cent. on preferred stock shall have been paid or

their payment fully guaranteed. Dissenting certificate holders must withdraw their certificates before February 4.

Pennsylvania R. Co.—The committee from Chamber of Commerce of Cincinnati appointed to investigate the feasibility of granting to the Pennsylvania R. Co. the right to lay additional tracks on the public landing, have reported adversely, and added to their report a statement that they do not favor moving cars on the connecting railway by daylight, but approving the suggestion made to the committee on terminals by President M. E. Ingalls, proposing the consolidation of the connecting railway with the existing terminals of the various roads of Cincinnati a belt system under one management. The report of the committee may have some weight with the board of legislation before whom is the ordinance to grant the Pennsylvania Company the right to lay tracks.

St. John & Lake Eustis.—The Florida Southern Railroad Co. has purchased the St. John & Lake Eustis road which extends from Astor to Leesburg, a distance of 39 miles. The road was sold at Tavares, Fla., in a foreclosure suit of the Mercantile Trust company and brought \$105,000.

Union Pacific.—The Boston News Bureau says: "The success of the Union Pacific committee in securing so promptly a majority of the first mortgage bonds of every division of the main line system is commented upon in financial circles. One of the members of the reorganization committee expresses himself as highly pleased with the confidence which first mortgage bondholders have shown in the effort of the committee to secure their rights in the face of the attempts which have been made both at home and abroad to keep the first mortgage bondholders disorganized and to thus defeat a sound reorganization. It is believed that no great difficulties now exist in proceeding promptly with foreclosure under the different first mortgages, and that with reasonable co-operation on the part of congress and the officers of the government, the finances of the main line system can be satisfactorily adjusted in the not distant future."

West Virginia Central & Pittsburgh.—Improvements and betterments were made on this line during the year 1895, which were substantially as follows: A steam plant for heating and power at Elkins, W. Va., consisting of three 100 horse power boilers, furnishing power and heat for the shops at that place, for the general offices, the railroad station and a large hotel and bank. The steam is carried under ground a distance of 500 ft. to the shops, and about 1,400 ft. to the furthest building heated. The general office building, completed during the year, is 50x90 ft., with L 25x25 ft., three stories, containing about 18,900 sq. ft. floor surface, and is pronounced a most complete office building by those competent to judge. Cost, \$16,000. All rooms, which are large and commodious, with ceilings 13 ft. high throughout, have abundance of light and were designed particularly with that point in view. At the same place four stalls have been added to the round house for shop purposes, and considerable machinery added to the shops proper. A new ice house capable of holding 300 tons of ice, has been put up for use by the passenger department. A frame car shed 40x140 ft., and an iron paint house 25x30 ft., have also been built. Four double frame dwellings and one single frame dwelling for the use of employees, have been put up at different points on the line. Two new coal plants have been started and all yards and sidings increased, making a total mileage of yards and sidings of over 40 miles. The company has also replaced 3 trestle openings with masonry and iron girders, using about 1,000 yards of masonry and about 100 ft. of girders, one being a stone arch bridge, 16 ft. opening. A great deal of additional work has been done in the way of straightening curves, putting in of ties and ballasting, costing very nearly \$30,000.

Wyandotte & Southeastern.—A certificate was filed by the Wyandotte & Southeastern with the secretary of the state of Arkansas reducing its stock from \$300,000 to \$50,000, also a certificate showing that 5 per cent of the stock has been paid up. This company controls a 10-mile line near Malvern.

Yazoo & Mississippi Valley.—In 1895 a branch was built on this line from a point in the Tallahatchie district 1.03 miles north of Minter City, east to Phillip City, Miss., a distance of 5.17 miles. This branch was opened for traffic on Dec. 27, 1895, and makes the total mileage of the road 812 miles.

NEW ROADS AND PROJECTS.

Alabama.—It is said that the Mobile & Birmingham road is about to begin building an independent line from Safford to Elma, a distance of 24 miles as that road now enters Elma over the tracks of the Southern. It is also said that Mr. T. G. Bush president of the Mobile & Birmingham is trying to arrange for terminal facilities at Elma.

Colorado.—Articles of incorporation of the Denver, Cripple Creek & Southwestern Railroad have been filed. The road will be a short line from Denver to Cripple Creek and the plan is to continue Southwest to Phoenix and thence on to the head of the Gulf of California.

Indiana.—The Madison County Belt R. Co., which was recently organized, has executed a \$150,000 mortgage on 540 lots in Alexandria for the purpose of getting funds to build a belt railroad around the city of Alexandria, and connecting all of the manufacturing plants. The company is said to be headed by St. Louis parties who are interested in the Union steel works, who appreciate the fact that Alexandria in the next 12 months will become not only one of the best shipping points to Indiana, but in the West. The road is to be built at once and be ready for spring.

Iowa.—On January 10 articles incorporating the New York & Boston Railroad Construction Co., with the principal place of business at Keokuk, were filed at the recorder's office at that place. The object of the corporation is to purchase, sell, build, hire, lease, mortgage, extend and equip all kinds of railroad, steamboat and steamship lines and canals; to purchase, sell, own, mortgage, and operate coal, iron, lead, zinc, gold, and silver mines and all other kinds of mines, including phosphate deposits; to buy, sell, hire, lease, mortgage, and hold all kinds of real

estate; to purchase, sell, build, and operate gas works and water works; to buy and sell stocks, bonds, mortgages, and other securities of railroad and other corporations and of individuals, and to do all other acts and things which are lawful and convenient for the purposes of the company. The authorized capital stock of the corporation is \$20,000,000, divided into shares of \$100 each. The incorporators are William M. Thacher, Charles W. Andress, Charles R. Mitchell, Charles T. Gregory and George Bell. The officers are Charles W. Andress, New York, president; Charles T. Gregory, New York, vice president; Charles R. Mitchell, secretary.

Mexico.—The Mexican Financier of recent date says: "A contract has recently been closed by General Mena, in the name of the executive, and Mr. Alberto Correa, for the construction of a railway from the capital of Tabasco to the margin of the river Gonzalez at the place called 'Tierra Colorado,' in the same state. Work must be started within 18 months and 3 kilometers must be completed at the end of the first year. Three years are allowed for the completion of the 9 kilometers."

Another contract has also been signed by General Mena and Mr. Albert Diaz Rugama for the construction of a railway from the Quiotepec Station, on the line of the Mexican (Veracruz) railway, to Usila. It must extend as far as Tuxtla, and touch at Santo Domingo del Rio, Jalapa and Ojital, in the state of Veracruz. Eighteen months have been allowed for the commencement of construction, which must be completed in ten years, at the rate of 10 kilometers a year."

It is said that the Mexican government has granted to an American syndicate the concession to build a railroad from Tonala to Tuxtla and from St. Gerónimo to the frontier of Guatemala, with a branch from Tapachula to St. Benito. The distance is 405 English miles, passing through the states of Oaxaca and Chiapas. The government, federal and state, have granted a subsidy of \$5,000,000, and the construction will begin in April, 1896. The syndicate will be incorporated under the name of Mexican & Guatemala R., with a capital of \$10,000,000. The syndicate is said to be represented by the following officers: President, Hon. Robert P. Porter of Cleveland, Ohio, ex-superintendent of the United States census; treasurer, Hon. S. W. Allerton, the well known Chicago millionaire; vice president and general manager, H. M. B. Bary of Philadelphia; general secretary, E. R. Bary, of Boston. The main offices will be in Chicago and the City of Mexico.

Missouri.—It is reported that the Lexington branch which is a part of the Gould system, and which has been completed as far as Boonville, will in the spring be extended to Gray's Creek, and there connect with the Missouri Pacific, two miles above Jefferson City. This projected line runs along the South bluffs of the Missouri River for a distance of 38 miles. It is said that the road had been surveyed and the right-of-way secured, and it will open up some of the richest agricultural lands in the state, besides proving a dangerous competitor to the St. Louis branch of the Missouri, Kansas & Texas, which is now getting a large amount of freight traffic from north of the river. The new road will run one mile south of Rocheport.

Pennsylvania.—The Pittsburgh, Monongahela & Wheeling R. Co., which was organized in October last to build a new line from the Pittsburgh & Lake Erie opposite Monongahela to Wheeling, W. Va., has at a meeting of the directors of the line voted to increase the capital stock from \$1,000,000, to \$2,000,000. It is stated that a contract has been awarded for the first 25 miles and the work of construction will begin March 1. The road is to be 52 miles in length. The president, William G. Dacey, of New York, was also prominent in the organization of the New Virginias Railway Co., which is to build a line from Huntington, W. Va., on the Ohio river, up the Guyandotte river valley through one of the most extensive coal territories in this country. It is thought to be somewhat significant that both the Pittsburgh, Monongahela & Wheeling and the Virginias companies have been organized by Mr. Dacey, and some think this may possibly indicate a combination between these roads when built, which would give the soft-coal mines of the Guyandotte valley an opportunity to ship direct to Pittsburgh and vicinity by using the Ohio River Railroad from Huntington to Wheeling, which would form the connecting link.

Russia.—Mr. W. L. Herkoff, chief engineer of the Irkutsk & Vladivostock division of the great Russian road, says that branch lines will be built into Afghanistan, over the Thibet mountains and into Belochistan and Persia. This will bring the new road into the center of Asiatic powers, and to the very doors of India. He also adds: "You will perhaps be interested to know that the Russian government is building several merchantmen to ply between Vladivostock and some port in Alaska. We are now building three of them at Vladivostock and three more are to be built at Cronstadt; they will all be finished within a year or so. It is not decided which port we will go to, perhaps one will be made, for the United States is to build a railroad to some point in north Alaska, and wherever it makes its terminus that we will make our port. This is a part of a grand strategic plan and it is being carried out by an understanding between the two countries. The United States will build a line north to Sitka across Bering sea islands as far as practicable, and from that point make a connection with the ships Russia is building, making the journey from Alaska to Vladivostock in twenty-four hours."

South Dakota.—The new road which the people of South Dakota are so anxious should be built to the Black Hills country now seems to be assured. It is said that the bonds to complete the first 32 miles from Rapid City to Mystic have been sold and all contracts signed. It is not definitely settled when work will begin but probably in the near future, and will be pushed energetically to the Wyoming coal fields on the west and the Missouri river on the east, thus giving the Black Hills a direct route to the eastern portion of South Dakota and the Eastern markets. Chamberlain is to be the Missouri River terminus of the new road, the construction of which will be of material benefit to Chicago and Sioux City.

Texas.—The charter for the proposed Rockport & Northern road, which is to be built between Rockport and Smithville, Texas—145 miles—has been executed, all capital

stock subscribed and required amount paid in. This line will take in the Rockport & Harbor Island road, which connects Rockport with Aransas Harbor proposed docks, and of which about 20 miles are already graded. It is said that a corps of engineers will be put in the field at once to locate a route for the new line which will connect with the Missouri, Kansas & Texas at Smithville. Among the stockholders are Alex. Brown, Walter B. Brooks, Jr., Percy C. McLaren, James Bond, of Baltimore, and J. C. Ryan, of New York. Bids are wanted for constructing the entire road. Address W. B. Brooks, Jr., 31 South Gay street, Baltimore, Md.

It is said that prominent capitalists at Paris, Texas, have determined to build a road from that place to Hooks Ferry on Red River, a distance of 30 miles. The main object in building the road is to strike the timber region and haul pine, walnut and oak to Paris, then to be converted into lumber, for which purpose large saw mills are to be erected. The plan is to have the road cross Red River at Hooks Ferry and be built on 16 miles further to Little River, in the Choctaw Nation, where there is an almost inexhaustible supply of timber of every variety. Another point in view is to get water rates for Paris, as Red River can be made navigable to Hooks Ferry all the year round by having a few snags removed. The road will be owned by Paris men. Meetings have been held and more are to be held in interest of the new road, and Mr. John Martin, president of the Farmers' & Merchants' Bank and also of the cotton firm of Martin Wise & Fitzhugh, has written to Congressman Culberson to urge an appropriation to remove obstructions from Red River to Hooks Ferry, to get a charter for a bridge across the Red River, and the right of way through the Choctaw Nation. It is expected that this road will ultimately reach the Little Rock & Memphis which has been in view for years.

INDUSTRIAL NOTES.

Cars.

—At the St. Charles Car Works there are now being built 200 cars for the Mexican Central and 100 for the Chicago, Paducah & Memphis.

—The Buckeye Malleable Iron & Coupler Co. is very busy and contemplates making an addition to its works at Columbus. Among recent orders was one for the equipment of the 500 cars ordered by the Toledo, St. Louis & Kansas City road from the St. Charles car works.

—The Great Northern Railway is equipping 500 of its cars with the rabbeted grain door made by the Chicago Grain Door Co.

—The Madison Car Co. has received an order from the Overland Fruit Dispatch for 100 Lorenz refrigerator cars. These cars are to be equipped with the Gould couplers.

—The specifications and blue prints for the 1,000 coal cars the Wheeling & Lake Erie, to which reference has already been made, have been prepared, and it is probable bids will be asked for within a short time.

—The Madison Car Co. has received an order from the Union Pacific, Denver & Gulf for two derrick cars.

—The Cincinnati, Jackson & Mackinaw road is reported as intending to place an order for 1,500 freight cars of various kinds.

—The New York Equipment Co., of 80 Broadway, New York, has just closed contracts for a large amount of rolling stock, to be used on the Chesapeake & Western Railroad of Virginia, now being pushed through to completion by the Old Dominion Construction Co., of New York. The orders include two passenger coaches, two combination cars (all equipped with six wheel trucks) twenty box cars, ten flats and twenty gondola cars. In addition to these orders the New York Equipment Co. has also closed contracts, since the first of the year, with the Lancaster & Hamden Railway for two passenger coaches and is shipping to the Lima Northern Railway Co., of Ohio, two large engines.

—The Madison Car Co., Madison, Ill., has received a contract for building 100 refrigerator cars for the California Fruit Transportation Co.

—The Duluth, South Shore & Atlantic has prepared specifications, and bids are asked for the building of 500 new ore cars.

—The Cincinnati, Portsmouth & Virginia Railroad Co. has lately increased its rolling stock, adding 100 gondolas, 100 box cars and two 84-ton Baldwin engines to its equipment.

—The Michigan Peninsular Car Co. is to build 500 cars for the Duluth South Shore & Atlantic. They are to be combination ore, flat and gondola cars, of a pattern designed by the mechanical department of the road and successfully tested in service.

—The Madison Car Works have taken an order for 100 refrigerator cars to be built for a private company and operated in the California business over the Santa Fe. Mr. D. M. McIntosh of Chicago represents the owner.

—The S. E. Barrett Manufacturing Co., No. 913 Stock Exchange Building, Chicago, manufacturers of roofing papers, has prepared specifications and will let the contract for the building of 10 new tank cars.

Locomotives.

—H. K. Porter & Co., Pittsburgh, will soon ship two very small compressed air mine locomotives to the Peermless Coal & Coke Co., Vivian, W. Va. It is said that nothing like them has ever been made.

—The Cincinnati Southern Co. has purchased five Baldwin eight wheeled locomotives, each weighing 63 tons.

—The 25 locomotives ordered by the Boston & Maine Railroad are divided between the Rhode Island Locomotive Works, which is to build 20, and the Manchester Works which constructs the other five. The entire order was originally erroneously stated to have gone to the first named works.

—The Baldwin Locomotive Works, Philadelphia, Pa., announces that on January 1, 1896, Messrs. Samuel M. Vauclain, Alba B. Johnson, and George Burnham, Jr.,

were admitted to partnership in the firm of Burnham, Williams & Co.

Recently a rush of work has come to the Pittsburgh Locomotive Works, and most of the men are now working overtime. Work has been commenced on an order for ten 18 x 24 ten wheel freight engines for the Pittsburgh & Lake Erie, which will be the finest engine ever run on that road. Other orders have been booked, and the increased demand for new motive power will keep the works busy all winter. Among the orders that have been filled recently was one for ten 17x24 ten wheel freight engines for the Lake Shore, the last one of which was delivered a few days ago. The first engines of this order turned out have been in service on the main line of the Lake Shore for some time, and have already made splendid records. Three passenger engines and three switch engines have also been constructed and delivered to the Cincinnati, Hamilton & Dayton Railroad, and Mr. Byron Boyle, traveling engineer, is now at Lima, Ohio, testing the new machines. Traveling Engineer George Gardiner is at Terre Haute testing two large compound engines for the Vandalia. In addition to the new work, a large amount of repairing has been done. A number of freight engines have been rebuilt for the Wheeling & Lake Erie, the Pittsburgh & Western, and other roads.

The specifications for the engines of the Baltimore & Ohio Southwestern Railway, which are being built by the Baldwin Locomotive Works, calls for Dunbar packing in the cylinders. Midvale tires will be used on the passenger engines, and standard tires on the freight engines. National Hollow brake beams will be used on the tenders of the freight, and Keweenaw beams on the passenger engines. Other specifications are Westinghouse-American brakes, Powell lubricators, Sellers injectors, Richardson balanced valves, and Scott springs.

The Cincinnati, Jackson & Mackinaw road, which has been reported to be in the market for a number of locomotives, is stated to be now ready to place the order.

Buildings.

The Norfolk & Western Railroad Company will rebuild its burned office buildings; new structure to be partly of iron, five stories high, and be fire-proof. Address Jos. H. Sands, general manager, Terry building.

It is announced that in order to meet the increasing demand of its business the Decatur Car Wheel & Manufacturing Co., of New Decatur, Ala., will enlarge its capacity by the establishment of a new plant at Birmingham, Ala.

The Keystone Axle Company, with headquarters in Baltimore, has commenced the erection of its new works at Beaver Falls, which are expected to be in operation next April. The company's specialty will be car axles by a new process, entirely dispensing with the use of the hammer.

Reports state that the St. Louis Car Co. and the American Car Co., of St. Louis, will erect a plant at Philadelphia, which will be run as a branch of their shops in St. Louis. They have secured an option on a 30 acre tract of land, and it is the intention to begin work at once on the erection of the buildings and plant, in order to commence operations in the spring. The industry will give work to 500 employes at first, but the force of employes will be gradually increased to 1,200. The Peckman Motor, Truck & Wheel Co., will also remove its works from Kingston, N. Y., and operate in conjunction with the new car works.

Bridges.

In our issue of last week it was stated that the streets at which viaducts will be built over the Illinois Central tracks at the lake front in Chicago were Madison, Van Buren and Harrison streets and Peck court. It is now stated that Monroe street will be carried over the tracks instead of Madison. This change was agreed upon at a subsequent conference between the city and the officers of the Illinois Central.

Contract has been let to John Shrader, of Pittsburgh, Pa., for the erection of a bridge over the Ohio river at East Liverpool, Ohio, connecting that city with West Virginia. The bridge is to cost \$225,000, and will be 1,400 feet long, with three spans, the middle one of which will be 700 feet. Work on it will be commenced at once, and it is expected to be completed this year. George P. Rust and others, of Cleveland, Ohio, are the interested parties.

The Kansas City & Atlantic Railway Company have adopted Mr. J. A. L. Waddell's design for a bridge across the Missouri river at Kansas City, which will comprise, with several fixed spans and an approach viaduct, a 421-foot span 63 feet wide with a counterbalanced lifting deck rising 54 feet to the upper platform.

One of the largest bridges in the country is being built by the Louisville & Nashville across the Ohio river between Cincinnati and Newport, Ky. It is to be completed about May 1. The new structure is to replace an old one, and the train service is maintained over the latter during the progress of the work. The entire cost will exceed \$750,000, but of this amount nearly \$500,000 has been spent in the masonry approaches and additions to the stone piers. Two new piers have been built, and the same number taken down, in order to make such a span over the channel as is demanded by river commerce. This span will be 510 feet. The total length of the bridge and approaches will be 3,700 feet, the bridge proper covering 1,650 feet of that distance. The amount of limestone masonry is 2,400 cubic yards. Since the construction began, May 28, 1895, eleven hoisting machines, two dredging machines, two pile-drivers, twenty flatboats, two tugs and the steamer Bellevue have been almost constantly engaged. Upward of 250 men have been employed, but there have been few accidents and only one fatality. When completed it will be one of the best combination bridges in the country.

The proposed bridge over the Monongahela at Rankin, Pa., will, it is said, be 2,200 feet long, with a 500-foot channel span, and with approaches crossing the tracks of the Pennsylvania. The estimated cost of the bridge is \$150,000.

Sealed proposals, in duplicate, upon blank forms furnished, will be received until 2 o'clock p. m., Monday, Feb. 3, 1896, for purchase of old superstructure of Rock Island bridge, consisting of about 5,626,760 lbs. wrought

iron and steel. Information furnished upon application to Col. A. R. Buffington, Ord. Dept., Comdg. U. S. Arsenal, Rock Island, Ills.

Stupp Bros.' Bridge & Iron Co., of St. Louis, reports lots of inquiries for figures on bridge work from Missouri and neighboring states. It is still busy on old contracts, and are getting its machinery in shape for a large business when the spring opens up.

The Elmira, (N. Y.) Bridge Co. is making heavy shipments for the new Northwestern Elevated Railroad in Chicago, the company holding a joint contract for the material with the Athens Bridge Co. The Elmira concern has shipped 50 car loads or iron work during each of the two past weeks.

The Virginia Bridge & Iron Co. has been incorporated at Richmond, Va., last week, the officials being as follows: Samuel Walton Tasewell, president; C. Edwin Michael of Roanoke, secretary and treasurer, and Charles C. Wentworth of Roanoke, chief engineer. This concern has purchased the plant and succeeds the American Bridge Co., whose works at Roanoke have been idle since last March. Some contracts have already been secured, and it is expected the plant will resume operations at an early date.

A bill has been introduced in the Virginia legislature to incorporate the Portsmouth & Pinner's Point Drawbridge Co., with a capital stock of \$25,000, for the purpose of constructing a drawbridge over a branch of the Elizabeth river. The incorporators are A. E. Warren, M. P. Eastward, A. B. Butt and others.

The city of Norfolk, West Virginia, contemplates the construction of an iron bridge connecting Berkley with Norfolk; said bridge to be 40 ft. wide, 24 ft. in the clear at high water mark, with a draw to span 100 ft. shipway; width of river, 700 ft. etc. For further particulars address H. B. Goodrich, chairman of committee.

On Jan. 6 the Southern Pacific threw open for business the new iron drawbridge across the San Joaquin river near Lathrop, abandoning the old structure. The new bridge was made by the Phoenix Bridge Co. of Philadelphia, and put in place by the Southern Pacific maintenance of way department. It has a total length of 477 feet, the draw span being 200 ft. long, the south approach 62 ft. and the two northern approach spans 108 and 107 ft. long respectively.

The Phoenix Bridge Co., of Phoenixville, Pa., has received the contract for the high trestle on the Central Railroad of New Jersey, over the Little Schuylkill river, in the Schuylkill coal regions of Pennsylvania. This viaduct is over 175 ft. high and 1,000 ft. long.

Iron and Steel.

The following changes in officers have been made by the Colorado Fuel & Iron Company, of Denver: Paul Morton, second vice president, has resigned and has been succeeded by J. A. Kebler; A. C. Cass has been elected third vice-president. Mr. Kebler will continue to act as general manager, and Mr. Cass as general sales agent. J. F. Welborn has been appointed assistant general sales agent of the fuel department, and J. E. Wickersham assistant general sales agent of the iron department. C. F. Freeland has been appointed cashier in place of W. A. Rose, resigned.

The Pratt & Letchworth Company, of Buffalo, was incorporated on January 11, to manufacture steel castings; capital stock, \$300,000. Directors, Josiah Letchworth, Ogden P. Letchworth, Robt. L. Fryer and Franklin D. Locke of Buffalo.

Machinery and Tools.

At the shops of the Paris Gas Company, in Tury, France, is a 5 horse power de Laval steam turbine which holds a high record for endurance. It operates an extractor 21 hours a day, and has now run for 5,300 hours. After 1,700 hours it was stopped for a brake test. Since then it has been running 3,600 hours continually. The peripheral speed of the disc being 525 ft. per second, 4,900,000 miles in all, or about 78 times the circumference of the globe, have been made since it started, and about 53 times the circumference in 150 days since it has been running without interruption. The result is the more remarkable as the machine is running without attendance. Some one has to fill up an automatic oil feed every 12 hours; that is all the attention it has needed; 120 lbs. of oil have been consumed each month.

E. H. Wilson & Co., 222 South Third street, Philadelphia, offer for sale the machinery of the Lamokin Car Works in the shops at Lamokin, Chester, Pa. This machinery includes a large variety of woodworking machines and machinists' tools made by Greenley Brothers, the Berlin Machine Co., Hilles & Jones and other well known makers, and a miscellaneous equipment. Among the woodworking machines are upright and horizontal mortisers, boring machines, tenoners, a number of styles of saws, lathes, etc. There are three boilers with fittings complete, a Buffalo blower, six tuyere irons for forges and one heating furnace. The tools may be seen by applying to Wilson & Co.

William Lodge, the founder of the Lodge & Davis Machine Tool Co., has sold his entire interest in the Lodge & Davis Machine Tool Co., Cincinnati, and will devote his exclusive attention to the Lodge & Shipley Machine Tool Co. The company manufactures a line of engine lathes from 12 to 42 in., and also chucking lathes from 12 to 48 in., 16 and 22 inch screw machines, and have recently brought out a massive screw and bicycle hub machine weighing 4,500 lbs. and taking 2 7-16 inch stock through the wire feed. The Lodge & Shipley Machine Tool Co. are crowded with orders, sufficient to keep their plant running for several months to come.

The works of the Morgan Engineering Co., of Alliance, Ohio, are very busy and running double turn. The largest order at present in hand is for 15 electric traveling cranes for the Carnegie Steel Co., and when these are installed this company will have 47 Morgan cranes in its works. The capacity ranges from 15 to 30 tons, and in the armor plate department four 60 ton cranes ordered from England are being rebuilt by the Morgan Co.

The export trade of the Davis & Egan Machine Tool Co., Cincinnati, O. (formerly the Lodge & Davis Machine Tool Co.), has increased very materially in the last year and is still increasing. The company is now making shipments to England nearly every week. It has just completed a large order and shipped same to Mexico and will in a few days ship one of its large machines to a large machine shop in Vienna. The volume of the foreign trade of the Davis & Egan Machine Tool Co. speaks eloquently for the quality and capacity of its tools.

The Brown Hoisting & Conveying Machine Co., of Cleveland, has orders for 10 of its Brown standard ore hoists for the Lake Shore & Michigan Southern road to be placed at Ashtabula, 10 for the Pennsylvania road at Erie, 3 for the Lehigh Valley at Buffalo and 1 for the Tonawanda Iron & Steel Co. at Tonawanda, N. Y. The work of this company has increased so rapidly that the force are compelled to work day and night.

The Springfield Malleable Iron Co., Springfield, O., has arranged with H. S. Bryan, master mechanic of the Duluth & Iron Range Road, for the exclusive manufacture of his draw bar attachment, recently patented. This attachment has already been applied to 1,600 cars.

The Pullman shops, Chicago, are stated to be in the market for a large order of metal and wood-working machinery.

Miscellaneous.

The Westinghouse Electric & Manufacturing Co. is reported to have arranged to lay off a portion of its men each noon alternately, in such a manner as to give all the men three-quarter time, this course being adopted in preference to a reduction of the force, because the indications are that when the spring trade opens the company will require the entire force full time and possibly more.

The Pennsylvania road is building a huge tank at Paterson, N. J., for the treatment of ties and bridge timbers with a new wood preservative which extensive experiments have shown to be valuable.

The currently accepted statement that the National Tube Works Co., McKeesport, Pa., was about to abandon the manufacture of steel pipe, is reported to be without the least foundation. The company states that its manufacture has been a perfect success; that out of between 400,000 and 500,000 tons it has manufactured in the past three years it has not received back enough to make a first-class puddle ball. The company also states that 95 tons of steel pipe are called for where five are specified to be of wrought iron.

The National Switch & Signal Co., of Easton, Pa., reports an order for two interlocking plants to be erected at Stockton, Cal., at the crossing of the Southern Pacific with the new San Francisco & San Joaquin Valley Railroad. This company is also doing some work for the Southern Pacific at Los Angeles.

The business men identified with the new company at Fultonville, N. Y., which has been reorganized and will manufacture wire fence, predict a prosperous year for the enterprise. The concern will be known as the American Fencing Co. Already they have orders for 20 miles of fence. The mode of operation is to purchase the old steel rails of the railroad companies and convert them into fence posts, on which will be strung the wire, also to be manufactured by the company. The stock of the reorganized concern is \$100,000, of which \$50,000 is preferred and the remainder common.

Announcement is made of the organization of the Audible Block Signal Co. at Buffalo, N. Y., with a capital stock of \$4,000,000. Frank McGraw is president; A. D. Bissell, vice president; C. W. Hammond, secretary and treasurer. The directors are J. T. McLaughlin, Martin Cary, John F. Cochrane, C. J. Wheclock, A. D. Bissell, and C. W. Hammond. The signal which it is proposed to handle is that which was recently put on four miles of the Chicago & Eastern Illinois Railroad near Glenwood for experimental purposes. Negotiations are said to be pending for the equipment of 100 miles of the lines of this road with the system. The reports of the tests thus far made with the four miles in service are very satisfactory, and both the promoters of the signal and officers of the road are confident that it will prove a pronounced success. The system is the invention of Mr. E. B. Cornell.

The Damascus Bronze Co. has closed contracts for 1896 with a number of the more important railways and has found it necessary in consequence of increased business to correspondingly increase its plant at once. The company is now putting in a 10 ton crane and a new drying oven for large castings.

The Columbia Car Coupler Co. of Atchison, Kan., has been incorporated in Kansas with a capital stock of \$150,000. The trustees are L. T. Backus, C. W. Weller, R. R. Herd and R. A. Park.

The Mississippi Glass Co. of St. Louis, has established a plant for the manufacture of high grade fire-clay products. The quality of its fire-brick, blocks and tile is highly commended by large consumers in St. Louis.

The general offices of the Sargent Co. have been removed to No. 675 Old Colony building, Chicago, Ill., to which place all communications to the company should be addressed.

The American Wood Preserving Co. of Beverly, N. J., is much pleased at the progress which is being made in the use of their "Woodiline" for the preservation of wood. An additional order has just been received from the Pennsylvania Railroad Co. for 100 barrels, containing 5,000 gals. of "Woodiline" to use in treating cross-ties and bridge timbers in their newly completed tank at Pavonia, N. J. Severe but satisfactory tests of this preservative have long been made by this company.

The Pennsylvania car shops at Lambertville, N. J., which have been for over two years working only five days a week and eight hours a day, have started six days' work a week and nine hours a day in order to keep pace with the requirements of the road.

Drake & Wiers of Cleveland, manufacturers of asphalt car roofing, are distributing a new edition of the little diary and engagement book which they have given away for several years.